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A Study of the Exotic Game Bird Introduction Program in the Sandy Point Area of Virginia 1970-1971

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A STUDY OF
THE EXOTIC GAME BIRD INTRODUCTION PROGRAM
IN THE
SANDY POINT AREA OF VIRGINIA
1970 - 1971

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Recognition should go also to the inhabitants of the Sandy Point area. Table 26 of the Appendix contains a list of people whose efforts resulted in the collection of a large portion of the data in this thesis. Appreciation is expressed especially to Mr. Adolph Hula, Mr. Lem Smith, Mr. M. R. Dotson, Mr. Stanley Hula, Sr., and Mr. A. N. Hofmeyer who willingly gave me ready access to their farms, making this investigation possible.

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ABSTRACT

A one-year study of the pheasant introduction program in the Sandy Point area of Virginia was conducted between June 26, 1970, and June 29, 1971. The main objective was to evaluate establishment factors and to test the feasibility of live-trapped pheasants for use as breeders in the pheasant stocking program. The release consisted of 700 hybrids between the Western Iranian blackneck pheasants (Phasianus colchicus talischensis) and the Chinese ringneck pheasant (Phasianus colchicus torquatus). The release was made in the fall of 1958 and the spring of 1959.

During this study, 987 pheasant observations were made on the area during 193 man-hours of field work. The majority of the birds observed were approximately 1 to 4 miles northwest of the original release site, which was on the Bayview area in the southeastern tip of Sandy Point. Tomahund Plantation which borders on the extreme southeastern portion of the Sandy Point area supports a large concentration of pheasants primarily due to the availability of cover, such as multiflora rose hedgerows and grain stubble.

Census techniques consisted of field observations, landowner interviews, brood counts, fall flushing counts, cock crowing counts, and nest counts. Census results indicated that substantial numbers of pheasants were present and that reproduction was adequate enough to support an established population. Spring breeding populations were small, yet a fair number of broods - 57 observations - were seen.

In the study, climatic influences are also discussed. Crowing activity reached a peak at the end of April and the nesting began in the middle of April. No data gave evidence that high temperatures during incubation was detrimental to reproductive success.

In 1967 and 1968, the inhabitants of the study area felt that there was a definite decrease in the number of birds seen, but reproduction seems to have been good the past two years. It is felt that this area supports an established population of pheasants and is considered by many to be the most successful establishment of pheasants in the Southeast.

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INTRODUCTION

During the years since 1881, nearly every state of the union has attempted to establish the ring-necked pheasant. However, successful establishment has been attained primarily in the northern half of the country. There are a number of theories concerning the reasons why this exotic bird has not done well in the South, but no real evidence has been found to explain its lack of success. Private and state game breeders continue to release pheasants and other exotic species in the South, hoping for their successful establishment.

Over the years not only has the land available for hunting decreased, but also the habitat, which at one time supported native game birds, no longer is suitable. Man, by changing the environment through land use practices such as developing large suburban areas and clean-farming, is one of the causes of this change. Due to the increase in the number of hunters and the decrease of native bobwhite quail habitat, game biologists and administrators suggested the introduction of foreign game species to supplement the native game birds of cultivated areas (Nelson 1964).

Acting upon this suggestion, the Virginia Commission of Game and Inland Fisheries, cooperating with the United States Bureau of Sport Fisheries and Wildlife, entered the Foreign Game Investigation Program in 1958. The first release consisted of 700 hybrids between the Western Iranian blackneck pheasant (Phasianus colchicus talischensis) and the Chinese ringneck pheasant (Phasianus colchicus torquatus). The

release was made in the fall of 1958 and the spring of 1959 in the Sandy Point Area of Charles City County. This release is considered by many to be the most successful establishment of pheasants in the Southeast.

This study was initiated to collect all relevant information and to evaluate the current status of the pheasant in the Sandy Point area. The main objective was to evaluate establishment factors and to test the feasibility of live-trapped pheasants for use as breeders in the pheasant stocking program. The observations and information were gathered (1) by interviewing people who were relatively familiar with the Sandy Point area, such as landowners, sportmen, Highway personnel, mail carriers, and Soil Conservation Service members and (2) by direct field observations.

REVIEW OF LITERATURE

Foreign Game Investigation Program

The first successful introduction of the ring-necked pheasant in the United States was in 1881 by O. N. Denny in Willamette Valley, Oregon (Walcott 1945). A total of 26 wild trapped pheasants was responsible for this original establishment (Bent 1963). Since 1881, state game departments and private individuals have released large numbers of exotic game birds. Most attempts, however, have ended in failure.

After World War II, the interest in establishing exotic game birds in various states increased greatly, resulting in the establishment of the Foreign Game Investigation Program in 1948 (Bohl 1968). The program is sponsored by the International Association of Game Fish, and Conservation Commissioners, the Wildlife Management Institute, and the United States Fish and Wildlife Service (Bump 1968).

Modern land practices, such as clean-farming, use of heavy machinery, and use of pesticides and herbicides have radically altered the environment, often to the detriment of native wildlife species. These factors suggest the possible feasibility of introducing exotic species which might be better adapted to the changed conditions.

Hart (1971) cited the decline in population size of the prairie chicken as an example of the danger of modern land use practices. The habitat of the prairie chicken lies predominantly in the pot hole areas of Wisconsin, Iowa, Minnesota, and the Dakotas. The draining of these

areas has reduced considerably the number of prairie chickens. However, the land has been changed into habitat suitable for various species of pheasants and other exotic game birds.

Certain areas in this country have never been occupied by more than one or two game birds, and some areas do not support any species (Bump 1968). Bump and Bump (1971) stated that originally not only game birds but also mammals were included in the program. Since native game birds have not done well and game mammals have not substantially been affected by modern land use practices, the program has continued only with the propagation of exotic game birds. Another factor in deleting the mammal is that big game species are sometimes known to have diseases such as rinderpest and hoof-and-mouth disease (Bohl 1968), whereas exotic game birds are relatively free from diseases.

The purpose of the Foreign Game Bird Introduction Program is two fold (Hardy 1966): (1) Federal and state biologists select types of birds capable of establishing and maintaining thriving populations in niches not presently occupied by native game birds. This is done by matching the exotic bird foreign game species and climate and habitat adaptations with the climate and habitat conditions of several states. Only wild trapped breeding stock are brought into these states where a high degree of compatability can be demonstrated (Hart 1969a). (2) The establishment of exotic game birds in areas where native game birds already exist but are not abundant would increase the hunting potential.

The steps, (Hardy 1964) and (Chambers 1965a), that must be followed in this program include: detailed ecological appraisal of game deficient habitats; original selection of types of foreign game

species that could possibly occupy and become established in this "new" niche; acquiring quarantine clearance for selected birds with subsequent transportation from the native habitats to state propagation facilities; propagation and conditioning birds for liberation; conducting releases; and most importantly, conducting follow-up studies to determine the results of attempted establishments.

The Foreign Game Investigation Program is a cooperative State-Federal project. In 1951, there were seven member states, in 1961 forty five states, and in 1970 forty six states (Bump and Bump 1971), and three U.S. territories (Bohl and Bump 1970). Of the 46 cooperating states, 32 of them have actively participated in the program. Over 150 species or subspecies of foreign game birds have been evaluated and 26 of these have been recommended for trial releases (Robinson 1970).

A great deal of time, research, and money has gone into this program. There have been establishments of certain species, but there have also been notable failures. Bump feels that the main reason for these failures has been the release of too few exotics over too short a period of time, and that at least 200-300 wild-trapped or 3 to 4 times that number of state game farm birds should be released on a single area for at least three years (Robinson 1968).

Sumrell (1971) stated that Tennessee, Missouri, Kentucky, and Louisiana are phasing out of the program because they have completed their work and research, and no new species or subspecies are available for propagation in their respective states. It is very likely that in the next few years the number of cooperating states will decrease, but the propagation of foreign game birds will probably continue on a state-by-state basis or by private breeders.

Virginia's Role in the Foreign Game Investigation Program

In 1958 Virginia entered into the Foreign Game Investigation Program under the direction of Mr. Dennis Hart, the State Game Manager (Hart 1970a). Before 1958, there had been a few unsuccessful exotic game bird releases by private landowners. In 1947, ringneck pheasants were released privately on Cedar Island in Back Bay, Virginia (Taylor 1971). The release was considered successful for years, but the population was maintained only by restocking every year.

From 1957 to 1966, Virginia has received nine different species or subspecies of pheasants and two partridges totaling 433 birds from the Foreign Game Investigation Program. These birds were used at the game farm for production of pure strains and crosses for experimental stocking. Since the first release in 1958, there has been a total of 152 releases with 36,546 birds released (Taylor 1971).

The success in establishing pheasants in different habitats in Virginia is dependent upon selection and maintenance of wildness in breeding stock (Hart 1963). The following techniques are used at the Virginia State Game Farm to breed for wildness, color, development, and normal health.

The Virginia State Game Farm located in Cumberland, Virginia, was formerly involved in a large-scale production of wild turkeys (Meleagris gallopavo silvestris) and bobwhite quail (Colinus virgianus virginianus), but has been converted to raising exotic game bird species.

Breeding pheasants are penned in harem breeding pens 9x12x6 feet high with an optimum breeding ratio of five hens to one cock (Hart 1963). Best results are usually obtained by mating yearling hens with 2-year-old cocks, or yearling cocks with older hens (Hart and Mitchell

1947). The breeding stock are usually kept for only one breeding season and never longer than three years, at which time they become part of an experimental release (Hart 1971).

The breeding stock are placed in breeding pens in the middle of February, about six weeks before the normal commencement of egg laying (Hart 1963). The hens lay three clutchs between the beginning of April and the last of June, averaging 30 eggs per hen (Hart 1971). This number varies depending upon the particular species or subspecies of pheasant. In 1964 the average number of eggs per hen (for the Western Iranian ringneck cross) was 39 (Chambers 1965a), and in 1965 the average number was 41 (Chambers 1966). The breeding stock remain in the harem pens until July, at which time they are transferred to colony, ground bottom or conditioning pens where they remain until their release in the following fall or spring. Some are used as breeding stock for the following spring.

The eggs are collected three times a day, and are stored in cases in a mechanical egg cooler. The temperature in the cooler is about 55 degrees F. with a relative humidity near 80 per cent. At weekly intervals, the eggs are removed from the cooler and allowed to warm up to room temperature before being placed in incubators. The incubation period is 24 days with a temperature of 99 1/2°F. (forced draft) and a relative humidity of 50 per cent (Hart 1963, and Hart 1970b).

After the eggs hatch, the young pheasants, numbering 200 to 300, are placed in colony brooder houses. The houses measure 12x14x8 feet high and contain a kerosene brooder heater (Hart and Mitchell 1947). The pheasants remain in the brooder houses for six weeks. During

their last three weeks in the houses they are allowed to venture outside on covered wire runs, but only for a few hours a day (Hart 1970b, and Hart 1971).

When the young pheasants are six weeks old, they are placed in intermediate, conditioning pens for three weeks. These pens are 10x40x6 feet high, and are raised 4 feet above the ground. There is about 10 feet of cover, 30 feet of exposed wire, and most important of all, no artificial heat. Only ambient heat is available to the young. During this period, moisture induces the functioning of the young bird's uropygial gland. The uropygial gland produces an oily substance which lubricates the feathers and also protects the bird in certain weather conditions (Hart 1970b).

At the end of these three weeks, the young are transferred to ground bottom pens where they remain until they are released in the fall or the early spring of the next year. There are eight different types of ground bottom pens, all of which are built with dimensions of 102x109x8 feet. For birds 9 to 14 weeks old there are approximately 23 square feet per bird. For over-wintering pheasants, there are between 30 and 40 square feet per bird (Hart 1970b, and Hart 1971).

At the time of an experimental release, the adult pheasants are taken at night to a predetermined area in carrying crates. The crates measure 2 ft. x 3 ft. x 10 in. high, and can hold a maximum of five birds. At the release site, one of two release methods may be employed, the direct release or the gentle release (Chambers 1965b). The direct release is commonly employed by the Virginia Game Farm with generally good results. In this type of release, the birds are released directly into the wild from the carrying crates. The gentle release

has been used sparingly in Virginia (Hart 1970b), Kentucky (Nelson 1964), South Carolina (Robinson 1968), Texas (May 1971), and Missouri (Chambers 1969). Covered release pens are used and can vary in size from 10x6x3 feet high (Hart 1971), to as large as 75x150x7 feet high (Chambers 1965b). Food and water are provided for the pheasants in the pen. After a short period of conditioning, ranging from a few days to a week, the pheasants are allowed to leave the pen. The ground level exits are opened at night enabling the birds to leave the pen in the morning when they discover the open exits.

The purpose of both release methods is to place a sufficient number of conditioned breeders in a given release area during the nesting season. Roby (1951) and Ellis and Anderson (1963) report that survival was not markedly influenced by the type of releasing method used. The specific situation will likely determine the method to be employed. Hardy (1964) stated that certain factors such as the species of pheasant being released, the extent of expected dispersion from the release area, the number of birds available for release, and the time of year the release is being conducted, would have to be considered when selecting the direct or gentle release method.

The main objective of the Game Farm is to produce birds which will become established in the wild. Hart (1971) feels that in the future the breeding of exotic game birds will be put into the hands of the private game-bird breeders, and that the Virginia State Game Farm will function in another capacity.

Morphological and Ecological Characteristics of Phasianus colchicus

The species Phasianus colchicus consists of 23 subspecies: four black-necked, six white-winged, three Kirghiz, one olive-rumped, and

nine gray-rumped pheasants (Bohl 1970, and Bump 1971). The range of Phasianus colchicus is from the northern Caucasus through Central Asia to China (Delacour 1959).

The most successful releases of pheasants in Virginia have been the talischensis cross, a hybrid between the Western Iranian Blackneck (P. c. talischensis) from Iran and the Chinese ringneck (P. c. torquatus) from the Imperial Valley, California. These hybrid pheasants apparently had the proper combination of characteristics which enable them to survive under the environmental conditions of Virginia (Virginia Commission of Game and Inland Fisheries 1960b). Since the majority of pheasants which were released in Virginia were hybrids, it is important to describe the characteristics of both the Chinese ringneck and the Western Iranian Blackneck.

The color of the Chinese ringneck cock has been described by Delacour (1945) and Allen (1965) as brightly colored; the red color is more restricted to the breast, with yellow and orange flanks, a yellow upper back, gray shoulders, and a green rump. The most noticeable feature of the cock is its broad white collar. The female is not only rather pale in color but also is mottled with browns and buff along the back, neck and sides.

The Blackneck pheasant is the most purple of all the true pheasants and has no trace of white neck rings (Allen 1965). The cock has strong coppery-red tones over the sides, breast, and back, with a dark green-purple head and neck, and brown shoulders (Delacour 1959). Compared with the Chinese ringneck hen, the Blackneck hen is darker and more mottled. The Blackneck pheasant weighs 1 1/2 to 3 1/2 pounds and is the larger of the two birds. The hybrid cocks may have the white

neck ring which is characteristic of the Chinese ringneck (Virginia Commission of Game and Inland Fisheries 1960a).

The native range of the Western Iranian Blackneck pheasant was reported by Bump (1968) as being in wet to dry, southern and southwestern coastal areas along the Caspian Sea in Northern Iran. In Iran, Bump (1963) reported that the Western Iranian was abundant where the temperature varied from a little above to a little below freezing in the winter, to 95 degrees in the summer, with an annual precipitation of 30 to 60 inches. The habitat of the Western Iranian Blackneck is cultivated lands and adjacent wooded-brush areas; semi-tropical to lower temperate zone vegetation; fields of rice, wheat, corn, cotton, tobacco, and sugar cane (Virginia Commission of Game and Inland Fisheries 1960b).

The native range of the Chinese ringneck is in Eastern China, Tonkin, and Indochina (Delacour 1945). The Chinese ringneck has been introduced in the very hot and dry Imperial Valley, California, and also in the cooler and more humid area of Oregon state (Allen 1965). The Chinese ringneck prefers agricultural areas with dense brush or on the edge of woods, especially pine woods (Bohl and Bump 1970).

Western Iranian Blackneck pheasants released in Kentucky from 1961-1966 were observed utilizing most of the cover types available, including pastures, woodlots, cultivated crops, fencerows, orchards, and idle land. During the winter when cover was at a minimum, the pheasants were observed in idle fields, thickets along ditches, pastures, fencerows, cornfields, woods, and hedgerows. With the coming of spring and the emergence of new vegetation and the start of breeding activities, the heavier cover available in the idle fields and thickets

appeared to be utilized less by the birds. There was widespread scattering over the area at this time (Nelson 1968).

The food of the pheasant varies according to availability during the different seasons of the year. The food usually consists of weed seeds, fruits, berries, insects, green food, and cultivated crops. Pheasants have also been known to consume snakes, mice, small crustaceans, and mollusks (Bent 1963, and Allen 1965).

Corn is the main diet over the greater part of the pheasants' American range. While it is a good source of Vitamin A, corn is also the poorest source of calcium (Allen 1965). Calcium is vital in reproduction, growth, and other physiological processes of birds (Labisky, Harper, and Greeley 1964). Where a lack of calcium exists, pheasants usually do not establish self-maintaining populations. Dale (1954) reports that it is very likely that the lack of calcium in the soil of the corn belt prevents it from being the best of the North American pheasant ranges.

The contents of the gizzard of a Western Iranian Blackneck hen, which was killed in Kentucky in 1962, included seeds of horsenettle (Solanum carolinense), wheat (Triticum spp.), sumac (Rhus spp.), beggar-weed (Desmodium spp.), milkweed (Asclepias spp.), Korean lespedeza (Lespedeza stipulacea), cleavers (Galium spp.), rose (Rosa spp.), buttonweed (Diodia teres), hawthorn (Crataegus spp.), blackberry (Rubus sp.), and fragments of grasshoppers and gut. The crop of a Western Iranian cock collected in Kentucky in 1965 contained 69 full kernels of yellow corn (Zea mays) (Nelson 1968). No information of food habit studies of the Western Iranian Blackneck pheasant or the Chinese ring-neck was available in their native ranges.

One method of determining the type of habitat utilized in the early morning by the cocks is the use of crowing call censuses. These have been conducted in various states and seem to be the most effective method of sampling a breeding population of pheasant males, especially when numbers are low and the birds are dispersed. Kimball, Kozicky, and Nelson (1956) found that the maximum seasonal crowing period for Ringnecks in South Dakota lasted during the entire month of May. Biologists in Virginia and Kentucky have found that the crowing intensity of the talischensis cross reaches a peak during the third week in April (Hardy 1963b). In the state of Washington, Nelson, Buss, and Baines (1962) determined that the peak crowing occurred on April 5, 1958, and on April 17, 1959. Hardy (1962) reported that in Tennessee, the maximum crowing period is from the last half of April through the first half of May.

Nelson (1964, 1968) reported that observations of intra-specific strife among pheasants showed it to be confined to the fighting of cocks during the breeding season. Also no inter-specific relationships between pheasants and native game species were observed.

Observations of Pheasants in Sandy Point, Charles City County, Virginia, 1958-June, 1970

In 1958, Virginia Game Biologists designated the Sandy Point area of Charles City County as the initial test plot for stocking pheasants in Virginia. The pheasants of the initial mating consisted of a cross between the imported Iranian Blackneck pheasants and the Chinese ringneck pheasant of the California Imperial Valley strain. A total of 700 hybrids from the initial matings were stocked in the Sandy Point area in September of 1958, 120 hens and 180 cocks, and in

March of 1959, 190 hens and 210 cocks. There have not been any further releases in this area (Hart 1969a and 1969b).

Brood rearing and winter survival over the past twelve years have suggested an established and self-sustaining population. Although the initial plantings did not disperse widely, fewer birds have been seen by landowners in recent years. A definite decline in the population appears to have occurred from 1965 to 1968. Hart (1969c) reported, "There is evidence that we do not have a stagnating population at Sandy Point. In spite of the relative island effect there, there is an obvious movement of birds across the Tomahund Creek into agricultural travel lanes leading toward New Kent County. Apparently the Sandy Point stocking is feeding a dispersal stocking to the North."

Since 1959, Game Biologists, notably Herman Tuttle, have visited Sandy Point many times to interview landowners and to conduct pheasant crowing censuses and flushing count censuses. Sandy Point has been visited only three times in the last twelve years for the purpose of extensive study.

From May 26 to June 26, 1959, a pheasant brood observation study was conducted. Fifteen landowners reported seeing 21 broods and 171 young or 8.14 young per brood (Hart 1970a).

In 1962, the area was visited once in March, June, and July. On July 11, Tuttle and C. H. Shaffer, the Supervising Game Biologist, made a 3-hour daybreak count. They observed 27 cocks, 11 hens, 55 young, and 9 broods. The average size of the broods was six (Hart 1969b).

On July 1, 1963, Game Commission Biologists, together with Dr. Gardiner Bump of the U.S. Bureau of Sport Fisheries and Wildlife,

made a 2 1/2-hour daybreak survey of Sandy Point and observed 25 mature pheasants, 13 broods, and 77 young. Also in 1963, Herman Tuttle made observations of pheasants on six non-consecutive days (Hart 1969b).

During the next three years the area was visited a total of 12 days in 1964, 11 days in 1965, and 4 days in 1966 for purposes of pheasant crowing censuses and general field observations.

On February 21, 1966, Lem Smith, a prominent landowner on Sandy Point, reported the discovery during the past hunting season of the remains of at least two pheasants and of an emaciated, yet still living, pheasant. The bills of the three birds were split, which led him to conclude that there was a lack of calcium or some other mineral in the basic diet of the birds (Hart 1970a).

On October 27-28, 1969, Fairfax H. Settle, District One Game Biologist, accompanied by two other Virginian biologists, flushed 20 males, 28 females, and one unknown in a 5 1/2-hour survey using dogs. Also Mr. Settle conducted crowing counts from 1965 to 1970 (Hart 1969b).

In the fall of 1968, Colonel Hugh M. Rutledge began to enlist the necessary aid of the local landowners again for the present intensive study of the pheasant population. For 11 days, between October 4, 1968, and March 1, 1969, he visited with the landowners and personally observed 34 cocks and 9 hens (Rutledge and Hart 1969).

Most often the pheasants were observed in the Northern end of the Sandy Point area where the landowners' dwellings are located. Not only were more birds seen in the inhabited area, but also they were notably less wary of intruders than the pheasants in the uninhabited southern area (Rutledge and Hart 1969).

Rutledge and Hart (1969) stated that discussions with the area residents indicated a decline in the number of pheasants seen over the past few years, which they attributed to the recent increase in the fox population and to illegal shooting on the uninhabited area of Sandy Point.

In the spring and fall of 1969 and 1970, Gerald Blank, Predator Trapper Supervisor, did some trapping in the area and trapped 10 gray foxes and 18 red foxes with 8 young in dens. Also, on April 8, 1970, he saw 42 pheasants as he drove and walked his trap line (Hart 1970c).

DESCRIPTION OF THE SANDY POINT AREA

Sandy Point

The Sandy Point area consists of about ten square miles of general farming country located in the point of Charles City County between the James and Chickahominy Rivers. The area is accessible only by Route 613. While the east side is bordered by forest, the north side is bordered both by forest and the Tomahund Creek which empties into the James River. The area is considered well protected, and the amount of initial disperal was slight.

The area consists of two main types of soil, Molena and Wickham on the Piedmont River Terraces within the Costal Plain Region. Most of the soil has an 8-10 inch layer of topsoil. The subsoil texture is loamy, fine sands, sandy-clay loam, and silty clay (Porter and Epperson 1963). The drainage sequence ranges from excessive to well drained. The pH of the topsoil varies between 5.5 to 6.5. After lime has been spread on the land every two or three years, the pH is approximately 6.2 (Davis 1971).

Though the area is divided into ten farms ranging in size from 50 acres to 936 acres, there are only four landowners who farm the entire Sandy Point area. Adolph Hula, Stanley Hula Sr., Lem Smith, and his eldest son, John Smith, either farm or rent the other seven farms.

The flat, fertile soil is well suited for agricultural practices such as raising small grain for Certified Seed. The entire area

is intensively farmed with the production of wheat, barley, soybeans, and some milo. A portion of the land is annually used for the production of corn. Approximately 288 acres are in permanent pasture enabling the small-scale production of beef cattle. John Smith also is engaged in raising hogs with the number varying between 500-700 annually.

The practice of planting soybeans immediately after the small grain has been harvested and the grain stubble has been plowed under is called double cropping. This method has been used successfully for the past 12 to 13 years.

Following the harvest of corn, soybeans, and milo in the fall, the "waste" crop such as stalks and grain stubble is immediately plowed under. Most of the area is then put into fall planting of small grain, the remainder being left bare during the winter to be planted in corn and milo the following spring.

Although excellent cover conditions existed during the late spring and summer, the fall harvest greatly reduced them. Therefore, winter cover was quite limited. The main types of cover utilized during this period were grain fields, woodlots, hedgerows, fencerows, and some widely scattered idle land, such as thickets, brush piles, and broomsedge. A 52-acre field of idle land supported a fairly high concentration of pheasants during the winter.

A thirteen-acre field which had been planted in Sericea lespedeza for at least twelve years prior to 1970 is located in the northern extreme corner of the Sandy Point area. The field has been in soil bank the last eight years (1962-1970), and was to be cut at least every two years. However, from 1966 to 1970 the field has been

left to grow. Because of this neglect, this field once the most productive site for pheasants, became one of the least productive areas on Sandy Point. The Sericea lespedeza field provided nesting cover in the spring and early summer, and excellent cover from predators during the remainder of the year. The thirteen-acre field is planted in small grain (Smith 1971).

Tomahund Plantation

Tomahund Plantation which is owned and operated by Arthur N. Hofmeyer and his two sons is situated approximately 7/10 of a mile west of the Chickahominy River bridge. The farm encompasses 875 acres of which the north and west sides are bordered by forest, and the east side by woodland and the James River. The Tomahund Creek which lies directly across from the extreme southeastern portion of the Sandy Point area borders on the south side of the farm. This farm is well protected, and the pheasants there show a minimal amount of dispersal away from the area, resulting in probably the largest concentration of pheasants per acre in Virginia. The original pheasants on Tomahund Plantation very likely dispersed from the release site on Sandy Point across the marsh area of Tomahund Creek.

The soil is of the Molena and Wickham type with a twelve inch layer of topsoil. The subsoil consists of 8 to 10 feet of sandy loam.

Four hundred acres of the farm is open land, the majority of which is planted either in small grain for the production of Certified Seed or in hybrid corn. Also, like most of the farmers on Sandy Point, Mr. Hofmeyer double crops. During the last two years, he has planted small grain by a new farming method called no-tillage planting. After

the wheat and barley are cut, the soybeans are planted. The grain stubble from the wheat and barley is not plowed under, but rather left standing. The no-tillage planting has given the pheasants more cover and waste grain for feed.

Excellent cover conditions existed during the spring and summer of 1967-1971. In the winter, there was more than enough cover with approximately 135 acres of grain stubble from the soybeans which remained over the winter to be plowed under in the spring. Extensive multiflora rose hedgerows, fencerows, and two woodlots were also utilized as cover. Along the edge of the forest, small patches of grain - milo, soybeans, and grain sorghum - were left from one spring to another, thus providing excellent cover and feed for the pheasants.

Even though Tomahund Plantation is not a part of Sandy Point, it will be included in future references to Sandy Point. The characteristics of Tomahund Plantation and Sandy Point are similar enough to justify this convenient combination.

METHODS AND MATERIALS

Census Methods

During the course of this study, six different approaches were used to evaluate the success of the pheasant population in the Sandy Point area. They are described in the order in which they were started in the study.

Field Observation Census

Field observation counts were made on the study area during the period, June 25, 1970, to June 29, 1971, in an effort to determine where the concentration of pheasants existed in the Sandy Point area, the main type of habitat utilized by the birds in different seasons of the year, and the general status of the population.

The procedure entailed covering the entire area in order to determine where the birds could be found. While some of the area could be covered by car, the majority was covered by walking. Hay fields, pasture, and idle land were carefully searched, as were wooded areas, grain fields, ditchbanks, and edges of hedgerows. All pertinent information was recorded on data forms as shown in Table 21 of the Appendix.

The route followed remained approximately the same each time the area was visited. In certain times of the year, however, some areas were not visited because of the insufficient habitat cover, and the unlikeliness of finding any pheasants in those particular places.

This, in turn, affected the amount of time spent in the field on a particular visit.

Landowner Interviews

Interviews with the residents of Sandy Point occurred on as many occasions as time would allow. Normally this was in the evenings at the end of the working day or on the weekends. From these interviews, the observer hoped to learn information concerning the main concentrations of pheasants, the type of habitats utilized, and the time of day the birds appeared most active. A landowner's observation form as shown in Table 22 of the Appendix was given out to 23 inhabitants of Sandy Point.

Brood Counts

Brood counts were conducted extensively in 1970, but only in the months of May and June in 1971. This was done along with the field observation study, during which time the area was visited on 112 different days from June 26, 1970, to June 29, 1971. Observations were made from the car and by walking in dense cover. The form used to record brood counts is shown in Table 21 of the Appendix.

The brood count techniques were similar to those used in other states. The observer visited the area early in the morning and/or late in the evening, continuing the search as long as the broods were visible. When possible, the total number of young in a brood were counted either by flushing the brood or by observing them in open areas. Also during the study, the number of hens without young were recorded. When a brood or any young pheasant was seen, the observer tried to determine the approximate age of the young. The age of the young seen

in the spring of 1971 was estimated according to the criteria given in Table 11 of the Appendix (Wagner, Besadny, and Kabat 1965).

Fall Flushing Count Census

Due to the lack of time and personnel necessary for an efficient count, a flushing count was conducted only once on October 26, 1970. The observer, with Game Biologists Settle, Carpenter, and Taylor, used four dogs to search thoroughly the Sandy Point area, excluding Tomahund Plantation, for three and three-fourth hours. The method used was similar to the procedure described by Hardy (1963a). The number and sex of the birds seen or flushed during the census were recorded on a form of the type shown in Table 23 of the Appendix.

Cock Crowing Count Census

In 1965, a crowing count route of 15 stations was established in the Sandy Point area by Virginia Game Biologist, Fairfax Settle. Since then, he has conducted a census at least once each spring. In the spring of 1971, the route was expanded to 16 stations when the southeastern extreme area of Sandy Point became accessible by car.

The route was run in a similar manner as was first described by Kimball (1949) and later by Hardy (1963a). The observer began the count one-half hour before local sunrise, and counted the total number of calls and the number of different cocks heard at each station for two minutes. Instead of stopping every mile between stations as prescribed by Kimball (1949), the distance varied from 1/2 mile to 3/4 mile. The entire route was approximately ten miles long.

During April and May of 1971, the route was run eight times. The information form used to record the crowing cocks during the survey

is shown in Table 24 of the Appendix.

On May 10, 12, and 14, 1971, a crowing count census was taken to determine the peak daily crowing activity. A station on Tomahund Plantation was used for this study. The census lasted from 90 minutes before sunrise until 90 minutes after sunrise. During this time, the total number of calls were recorded at 10-minute intervals. The form shown in Table 24 of the Appendix was used for this particular census.

Nest Counts

During the study, there were concentrated efforts on five different occasions in the spring of 1971 to locate nests. The time spent in this study totaled 11 1/2 hours. The area searched consisted of hedgerows, fencerows, ditchbanks, thickets, pasture, hay fields, and idle land.

Crop and Land-use Practices

In order to get a complete picture of the relationship of the pheasants to the use of the land, the following data were gathered: total acreage of each farm, type and the amount of crops, the cropping patterns, amount of cover and game food, the type of soil, weather data, and changes in land use practices since 1958 when the pheasants were first released.

The information about the total acreage of farms, and the type and amount of crops, and the cropping patterns were obtained from the four largest landowners in Sandy Point: Adolph Hula, John Smith, Stanley Hula, Sr., and Norman Hofmeyer. These four men were able to supply the needed information since they cultivate the entire Sandy Point area. Data only for the growing seasons of 1970 and 1971 were

collected. Table 26 of the Appendix presents a list of the cooperating Sandy Point residents who were interviewed for the purpose of gaining information about the influences and effects exerted by them on the land and, therefore, indirectly on the pheasants.

Trapping

Live-trapping of pheasants was conducted from January 30 until March 14, 1971, using a Kentucky-type ruffed grouse trap. The main purpose of the trapping was to obtain birds that could be used as breeding stock at the State Game Farm. A secondary purpose was the collection of data concerning weights, movement and concentration of pheasants.

The Kentucky-type ruffed grouse trap is composed of three wire sections which are staked to the ground. The sides were made of chicken wire and the top covered with fish net. The center structure was clover-leaf in shape with dimensions of 25 inches high, 56 inches wide, and 30 inches between the two entrances. The wire entrances, 13 inches high, were bent inward at an angle so that the opening was wide enough for a pheasant to enter.

Extending outward from each door of the center structure was a piece of wire measuring 17 inches high by 10 feet long. This connected the center with the two other structures of the trap. The end sections were circular with one door and measured 25 inches high and 34 inches in diameter. The entire trap measured approximately 29 feet in length.

The trapping was attempted in the 52-acre field owned by the Peterson family. The field is idle land, consisting of broomsedge,

thickets, brush piles, and two marsh areas. The area was considered ideal for trapping because of the type of cover and because of its known population of pheasants as determined from previous observations.

The trap was baited with shelled and cracked corn. During the first four days of trapping, the doors of the trap were closed with corn scattered around the outside in an attempt to attract birds to the site. After this period, the doors were opened and bait was placed inside the trap with some corn in the vicinity of each of the four doors.

At weekly intervals, the trap was shifted around. For the first two weeks, the trap was checked twice a day, in the morning and evening, but during the last four weeks, it was visited only once a day.

Other Wildlife Observations

Whenever the study area was visited, all observations of certain wildlife species seen were recorded. Species included in the observations were bird and mammal predators as well as game species.

Food Habits

The first hunting season for pheasants in Virginia was opened on November 16-17, 1970. During the two days, nine cock pheasants were killed in the Sandy Point area. All sportsmen who shot a pheasant were requested to complete a form of the type shown in Table 25 of the Appendix. They were interviewed primarily with the intent of obtaining vital information about pheasant concentration, habitat utilization, and the weights and ages of the cocks. The procedure of Dale (1956) to determine the age of the cocks was used. Spur length is a rapid way to estimate the age of the cocks.

Secondarily, the crops were removed from seven cocks with a pocket knife in order to determine the food habits of the birds. On December 5, 1971, their contents were placed in seven separate envelopes and dried at 80°C for 48 hours. At the end of the drying period, the envelopes then were placed in a dessicator until December 10, when the contents then were weighed on a Sartorius-2400-Digital Analytical Balance.

Climatic Influences

From July 21, 1970, to June 30, 1971, the temperature and humidity were recorded on a hygrothermograph. The hygrothermograph was self operating for a week, at which time the clock mechanism had to be wound. A standard U.S. Weather Bureau Weather House was set up in the backyard of M. R. Dotson's property to store the hygrothermograph. A wet and dry bulb hygrometer was used periodically to ensure the accuracy of the hygrothermograph.

The data for the period June 1, 1970, to July 21, 1970, and for days on which the hygrothermograph was not functioning were obtained from the monthly publication, Climatological Data - Virginia,* which is published by the U.S. Weather Bureau. The town of Williamsburg, Virginia, was used as the weather station for these additional weather data. The approximate distance from Williamsburg to the Weather Station on the study area is 23 miles.

The climatological data for Virginia were used to obtain the mean annual rainfall and temperature from 1967 to 1970, and the amount of rain for each month during the study period, June, 1970, to June, 1971.

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*Climatological Data - Virginia (1967-1971).

RESULTS AND DISCUSSION

Census Methods

Field Observation Census

During the course of the study, a total of 987 pheasant observations was made (Table 1). Forty-one per cent of the birds seen were on Tomahund Plantation. Table 2 represents data on 987 pheasants observed, showing that 804 birds were adults. Among the adult birds were 449 cocks, 344 hens, and 11 birds of unknown sex. An over-all total of 3.95 adult birds were observed per man-hour of field work (Table 3). In April of 1971, 11 days, totaling 18 hours, were spent in the field. During this time 175 birds were recorded with a bird/man-hour index of 9.61 which was the highest for any month of the study period. On September 21, 1971, 23 different birds, 15 cocks and 8 hens were seen in a 2 1/2 hour period.

Figure 1 and Table 3 show the values of the adult birds observed per man-hour for each month. There are two definite peaks, one in November, 1970, of 6.24 and the other in April, 1971, of 9.61. The November peak can be explained by the lack of habitat utilization, and some grouping of birds into flocks. In April, the cocks, of which there were 125 observations (Table 2), were engaged in crowing and courtship and hence were easier to observe. The hens (50 observations) were difficult to find, and could only be observed by flushing them out from small grain fields.

Figure 1

Pheasant Observation Data
Period: June 1970 - June 1971

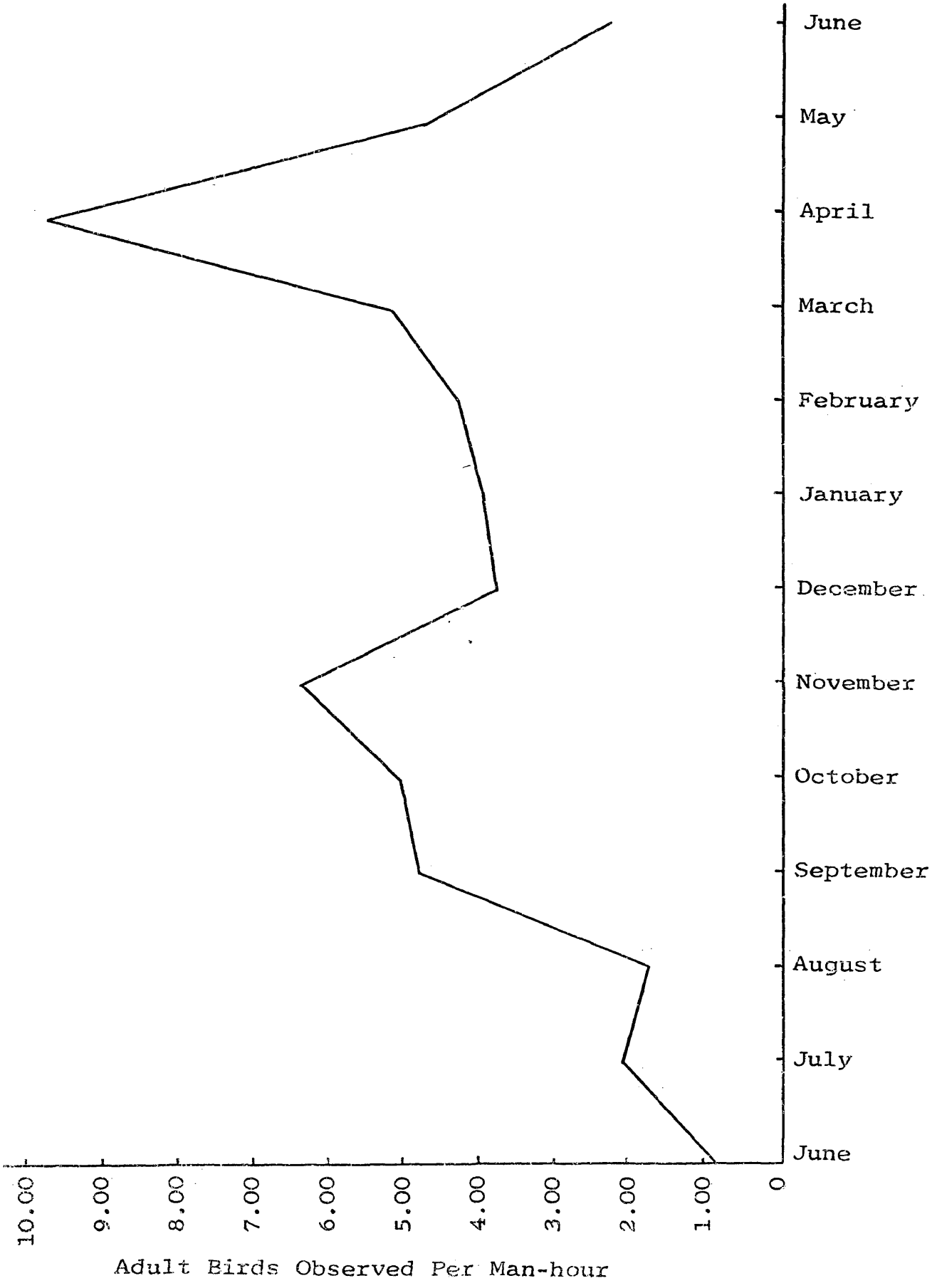

June
May
April
March
February
January
December
November
October
September
August
July
June
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0
Adult Birds Observed Per Man-hour

TABLE 1

Pheasant Observations by Season
June 1970-June 1971

Landowner's Area	Summer June-Aug.	Fall Sept.-Nov.	Winter Dec.-Feb.	Spring Mar.-May	Summer June	Total
J. C. Smith	3	1	-	4	-	8
M. R. Dotson	30	6	6	12	-	54
Garrison	18	2	8	-	-	28
Peterson	11	38	45	3	-	97
S. Hula Sr.	15	4	1	35	13	68
R. Dotson	1	3	1	-	-	5
L. Smith	59	37	6	49	11	162
A. Hula	8	3	1	14	-	26
Ruffin	98	8	2	24	-	132
Bayview	-	1	-	1	-	2
Hofmeyer	28	214	8	137	18	405
Totals	271	317	78	279	42	987
Percent of Total	27.5%	32.1%	7.8%	28.3%	4.3%	

TABLE 2

Pheasant Observations
June 1970-June 1971

Observation Period	Cocks	Hens	Young	Broods	Undetermined Sex	Total Adult Pheasant Observations
June-1970	4	5	6	2	-	9
July-1970	37	37	73	20	-	74
August-1970	14	39	57	23	-	53
September-1970	81	48	18	11	-	129
October-1970	55	26	3	1	8	75
November-1970	50	27	-	-	3	53
December-1970	3	10	-	-	-	13
January-1971	1	16	-	-	-	17
February-1971	15	33	-	-	-	48
March-1971	35	42	-	-	-	77
April-1971	125	50	-	-	-	175
May-1971	19	5	-	-	-	24
June-1971	10	6	26	4	-	16
Totals	449	344	183	61	11	804

TABLE 3

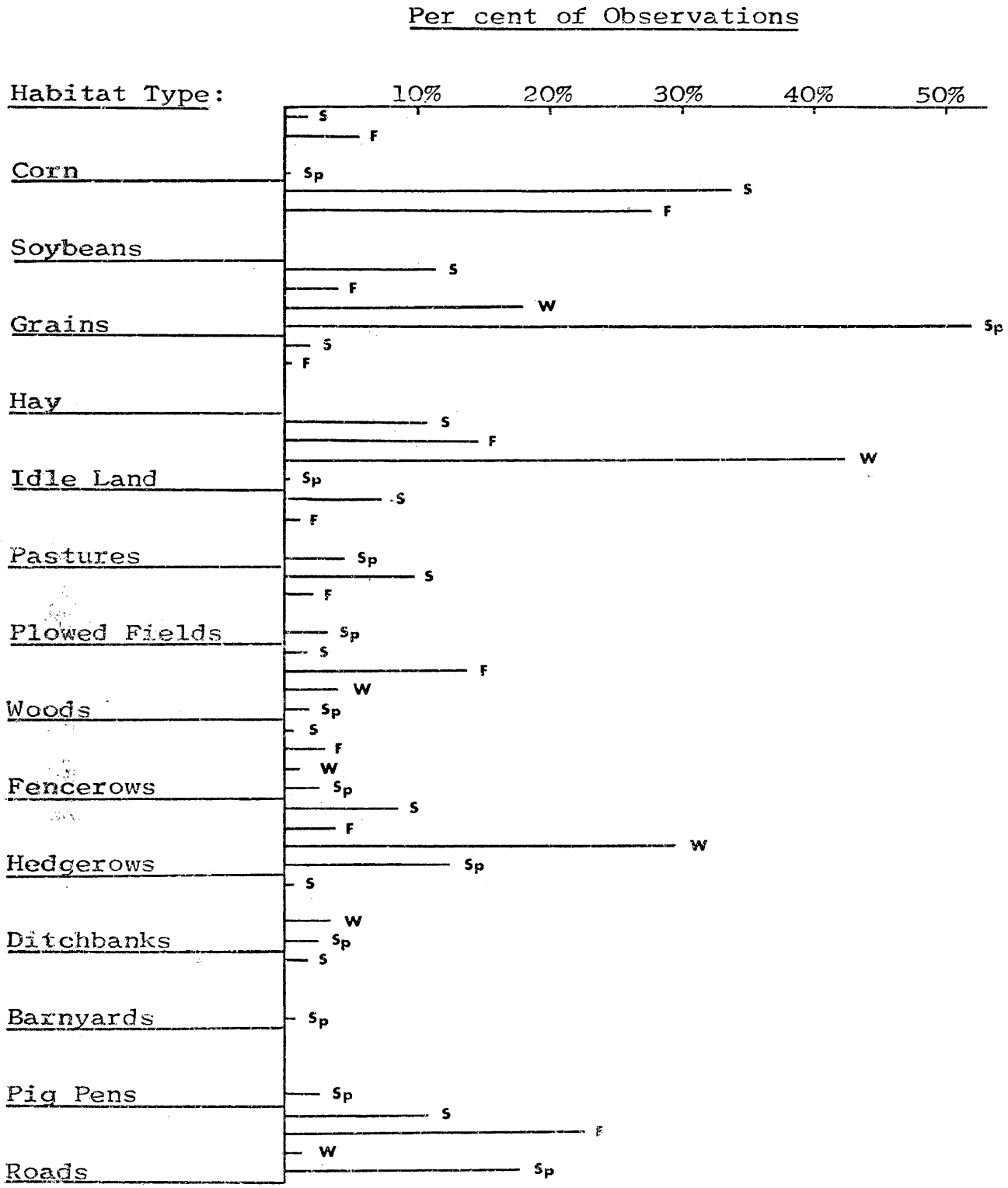
Pheasant Observations Per Man-Hour
June 1970-June 1971

Observation Period	Total Adult Pheasant Observations	Total Days Spent in Field	Total Man-hours Spent in Field	Adult Birds Observed Per Man-hour
June-1970	9	4	11.50	.78
July-1970	74	16	37.00	2.00
August-1970	53	13	28.00	1.89
September-1970	129	15	28.00	4.61
October-1970	75	8	15.00	5.00
November-1970	53	7	8.50	6.24
December-1970	13	2	3.50	3.70
January-1971	17	6	4.50	3.77
February-1971	48	11	11.50	4.17
March-1971	77	9	15.25	5.04
April-1971	175	11	18.00	9.61
May-1971	24	5	5.25	4.56
June-1971	16	5	7.00	2.29
Totals	804	112	193.00	3.95

The habitat and therefore the landowner's property which was occupied by a bird when observed was recorded. Results are listed in Tables 12, 13, 14, 15, 16 of the Appendix and shown graphically in Figure 2. The summer of 1971 is not included in Figure 2 because June, 1971, was the only month of the summer that was incorporated in the study. The figures reveal that the corn fields were not utilized to a great extent by the pheasants. Immediately after harvesting, the corn was plowed under and therefore did not supply a source of food in the winter. Soybeans were important in the summer and fall for food and cover. Grain fields were utilized by the pheasants in all the seasons, particularly during the spring. A total of 51.8 per cent of the birds were observed in the spring in grain fields. Hay fields were utilized only in the summer and fall. Idle land, including weed and broomsedge fields and briar thickets, were used all year round, especially during the winter when the amount of cover was low. A total of 42.4 per cent of the birds were seen in the idle lands. Pastures appeared to be used very rarely due to their scarcity. Approximately 7 per cent of the study area was in pasture. Plowed fields and fields left in summer fallow were used in the spring and summer due to the presence of insects and worms as a source of food, especially for young pheasants, and the increased number of plowed fields and fields in summer fallow. Woods were utilized during all seasons for roosting sites for both the cocks and the hens, and the edges of woods were commonly included in a cock's territory. Fencerows and hedgerows also provided excellent cover throughout the year. In the winter, 29.5 per cent of the birds observed were in hedgerows. Ditchbanks were utilized in the summer, winter, and spring for their cover. Although few birds

Figure 2

Habitat Occupied by
Observed Pheasants According
to Season



S = Summer (June, July; Aug.)
F = Fall (Sept., Oct.; Nov.)
W = Winter (Dec., Jan.; Feb.)
Sp = Spring (Mar., Apr.; May)

were noted in barnyards and pig pens, these areas were used occasionally for feeding purposes. Roads were utilized in all the seasons, especially in the fall and the spring.

Observations of intraspecific relationships among pheasants were confined to the occasional fighting, courting, and mating during the breeding season. The first fighting was observed between two cocks in the early morning of March 13, 1971. Three instances of cock fighting which involved six individual birds were observed on April 12, 1971, on Tomahund Plantation. During one fight, a hen was within four feet of the cocks. An unsuccessful attempt of a cock to mate with a hen was observed on April 3, 1971. Courting was observed as late as July 6, 1971, in the edge of a wood lot.

No extensive winter flocking by sex was observed. Five cocks were seen on November 14, 1971, in the road of Tomahund Plantation. On February 11, 1971, eight hens were flushed from a hedgerow on Mrs. Garrison's property. The lack of large single-sex flocks was probably due to the relatively low population size and the mild winter conditions.

No instances of any conflict between pheasants and native game species were noted, except the usual predator-prey relationships. On July 11, 1970, an unknown species of hawk was reported to have killed a young pheasant. Also in the latter part of August, a gray fox was seen running after a hen which appeared to have a broken wing. However, when the fox approached too closely, the hen flew off (Hofmeyer 1970). This type of behavior has been described by the words "injury-feigning" or "broken-wing display" and has been observed in killdeer (Berger 1961).

During the spring of 1971, seven cocks on six different occasions were observed in two pens with a number of hogs. Pheasants have also been seen in the close proximity of cattle in the pastures.

On September 15, 1970, a cock, hen, and a covey of ten quail were flushed from a brush pile. On February 18, 1971, a hen and two quail were flushed from a broomsedge field. In both cases, no inter-specific strife was noticed.

Landowner Interviews

The interviews were carried out with all of the residents of the study area, some only once and others as many as 20 to 30 times. Of the 23 forms of the type shown in Table 22 of the Appendix that were distributed, 10, or 43.5 per cent, were returned. Eight people, or 34.8 per cent, took part in recording pheasant data for the entire study period. One inhabitant moved away in November. The results of the landowner's observations are presented in Table 4. Five hundred and seventy-six observations of pheasants were made with an index of 2.19 birds observed per sight-day. The ratio of cocks to hens was 1:1.3. More birds were seen in the spring of 1971 than any other season.

Also, it was learned from the interviews that the main concentration of pheasants in Sandy Point existed in an area of close proximity to the majority of the residential dwellings. Tomahund Plantation also supports a large concentration of birds. Pheasants were observed mostly along the edge of roads and in the grain stubble of small grain. The reports show that the pheasants were most active in the morning between 7:00-8:00 A.M. and in the late evening between 6:00-7:00 P.M. No attempts to search out the pheasants were made by the residents.

TABLE 4

Pheasant Observations Reported by Landowners
From July 1970 to July 1971

Landowners	Summer		Fall		Winter		Spring		Summer (June)	
	cocks	hens	cocks	hens	cocks	hens	cocks	hens	cocks	hens
J. C. Smith	7	7	13	8	14	9	27	44	1	3
M. R. Dotson	9	10	2	3	1	7	5	8	-	-
R. Dotson	1	12	2	4	6	30	12	41	2	10
Adolph Hula	10	2	9	4	2	6	13	5	-	3
M. M. Hula	4	7	2	2	2	5	3	-	-	-
Frank Hula	1	1	2	2	-	2	-	-	-	-
Mickey Hula	-	-	7	-	5	1	11	7	-	1
Doris Lampkin	1	5	5	-	-	-	-	-	-	-
G. Wilson	-	-	2	2	-	-	-	-	-	-
N. Hofmeyer	10	2	-	-	-	-	-	-	-	-
Totals	43	46	44	25	30	60	71	105	3	17

TABLE 4 (continued)

Landowners	1970 Young	1970 Broods	1971 Young	1971 Broods	Total	Days	Index Birds/Sight-day
J. C. Smith	19	8	26	3	178	73	2.44
M. R. Dotson	6	1	-	-	51	29	1.76
R. Dotson	5	1	6	3	131	61	2.15
Adolph Hula	5	2	27	3	86	41	2.09
M. M. Hula	-	-	-	-	25	11	2.27
Frank Hula	21	2	-	-	29	5	5.80
Mickey Hula	-	-	3	1	35	21	1.67
Doris Lampkin	-	-	-	-	11	10	1.10
G. Wilson	-	-	-	-	4	4	1.00
N. Hofmeyer	14	3	-	-	26	7	3.71
Totals	70	17	62	10	576	262	2.19

It was the general feeling of the landowners that pheasants had been quite prevalent from 1958 to 1967. In groups of 20 to 30, birds were frequently seen in the roads, and on one occasion in December, 1967, two hens were perched on a box looking in a kitchen window (Dotson 1970). In the fall of 1962, it took two dogs 1 1/2 hours to flush 23 pheasants out of a Sericea lespedeza field (Smith 1970).

In 1967 and 1968, not only were a lesser number of birds observed but also the number of young in broods appeared to be decreasing as compared with those broods seen in the past. The decline in pheasants was attributed to two factors. One was the large number of foxes in the area, which as a common predator of pheasants, were believed to have killed many of them. The second factor was the 13-acre field of Sericea lespedeza which had been in Soil Bank from 1962 to 1970 but which had been allowed to grow up and remain uncut since 1966. As a result, the most productive nesting site was destroyed.

The landowner interviews are difficult to interpret quanitatively, and are only presented here with the hope of giving some idea as to the status of the population.

Brood Counts

Broods were observed during the summer of 1970 and 1971. Table 5 shows that in 1970, 157 observations of young and 57 observations of broods were made. From these data it may be seen that the average brood size was 2.8. In 1971, four broods containing 26 young were observed with an average brood size of 6.5. The largest brood seen in 1970 consisted of eight young, this number being observed in two different 9-week old broods. On June 29, 1971, along the edge of

TABLE 5

Brood Size-Age Data

Age	Number Chicks 1970	1971	Total	Number Broods 1970	1971	Total	Average Brood Size No. Chicks/Brood 1970	1971	Overall
Newly Hatched (1 week)	5	8	13	1	1	2	5.0	8.0	6.5
1/3 Grown (4 weeks)	19	8	27	7	2	9	2.7	4.0	3.0
1/2 Grown (6 weeks)	3	10	13	1	1	2	3.0	10.0	6.5
2/3 Grown (8 weeks)	6	-	6	2	-	2	3.0	-	3.0
3/4 Grown (9 weeks)	82	-	82	30	-	30	2.7	-	2.7
Full Grown (12 weeks)	42	-	42	16	-	16	2.6	-	2.6
Total	157	26	183	57	4	61	2.8	6.5	3.0

the corn field, the observer saw a hen and ten young on Stanley Hula, Sr.'s property. The main types of habitat utilized by the broods were either soybean fields or hedgerows.

The number of broods and young seen each month during the study period is recorded in Table 2. July and August were the most productive months with young totaling 73 in July and 57 in August and with the broods numbering 20 and 23 for the respective months. On four occasions the cock accompanied the hen and young and only twice was a cock seen alone with the young. Forty-one hens were observed without young between June and August of 1970. These birds most likely included those hens that had already brought off a brood or were in the process of doing so for September or October. On October 12, 1970, a hen with three eight-week-old chicks was seen in a grain sorghum patch on Tomahund Plantation. Therefore, the young probably hatched out during the third week of August. This is considered to be late in the season for pheasants. Hatching would occur normally between the middle of May and the middle of June. However, Dale (1956) reported that hens can lay three clutches of eggs if the two earlier ones are destroyed during laying or during the early incubation period.

Fall Flushing Count Census

During the 3 3/4 hours of searching, five cocks and nine hens were flushed from habitat consisting mainly of idle land and hedgerows. The total number of birds flushed no doubt would have been much higher than 14 if Tomahund Plantation had been included in the search.

The flushing count index for October 26, 1970, was .44. This value was obtained by using the following formula:

$$X = \frac{Y}{(a+b)c}$$

X = Flushing count index (birds flushed per man-dog hour)

a = Number of observers

b = Number of dogs

c = Number of hours of search

Y = Total number of birds observed

The flushing count indices from past years were: 1.38 for March, 1965, 1.27 for November, 1965, and 1.24 for October, 1969. The November, 1965 and 1969 censuses included Tomahund Plantation. The 1970 index cannot be compared with the past indices because the entire Sandy Point area was not covered. Also the determination of the sex ratio from one census alone in 1970 would not be reliable. Therefore, the exact sex ratio of pheasants in the study is not known.

Cock Crowing Count Census

During the period from 1965 through 1969, Game Biologist Fairfax Settle conducted crowing count censuses on ten different occasions. His results (Settle 1971) in Table 6 show that the peak of crowing activity is reached in the latter part of April and early part of May.

Beginning on April 9, 1971, the area was visited eight times and a cock crowing count census was conducted. The results of the crowing count census are presented in Table 7. The relatively low population of cocks in the area probably allowed a more accurate census than is usual when using this method. The highest number of crowing calls, 35, occurred on April 25, 1971, and the lowest, 10, on May 27, 1971.

TABLE 6

Crowing-Cock Indices (1965-1970)

Date Run	Number of Stations	Crowing-Indices Average Number Calls Per Station
5-4-65	15	2.20
5-15-65	15	2.00
5-19-65	15	1.53
4-19-66	15	2.27
5-5-66	15	1.93
5-11-66	15	3.07
5-26-67	15	1.93
4-30-69	15	1.60
4-29-70	15	1.73
5-13-70	15	1.33

TABLE 7

Pheasant Crow Count Census During 1971

Date Run	Number of Stations	Crowing Calls	Individual Pheasants			Crowing-Indices
			Crowing	Cocks Observed	Hens Observed	Ave. No. Calls Per Station
4-9	16	28	16	6	5	1.87
4-16	16	34	27	3	1	2.27
4-20	16	29	23	7	3	1.93
4-25	15	35	23	12	5	2.33
5-5	15	23	18	6	1	1.53
5-8	16	19	14	4	1	1.27
5-15	16	18	11	5	2	1.23
5-27	15	10	6	1	0	.67

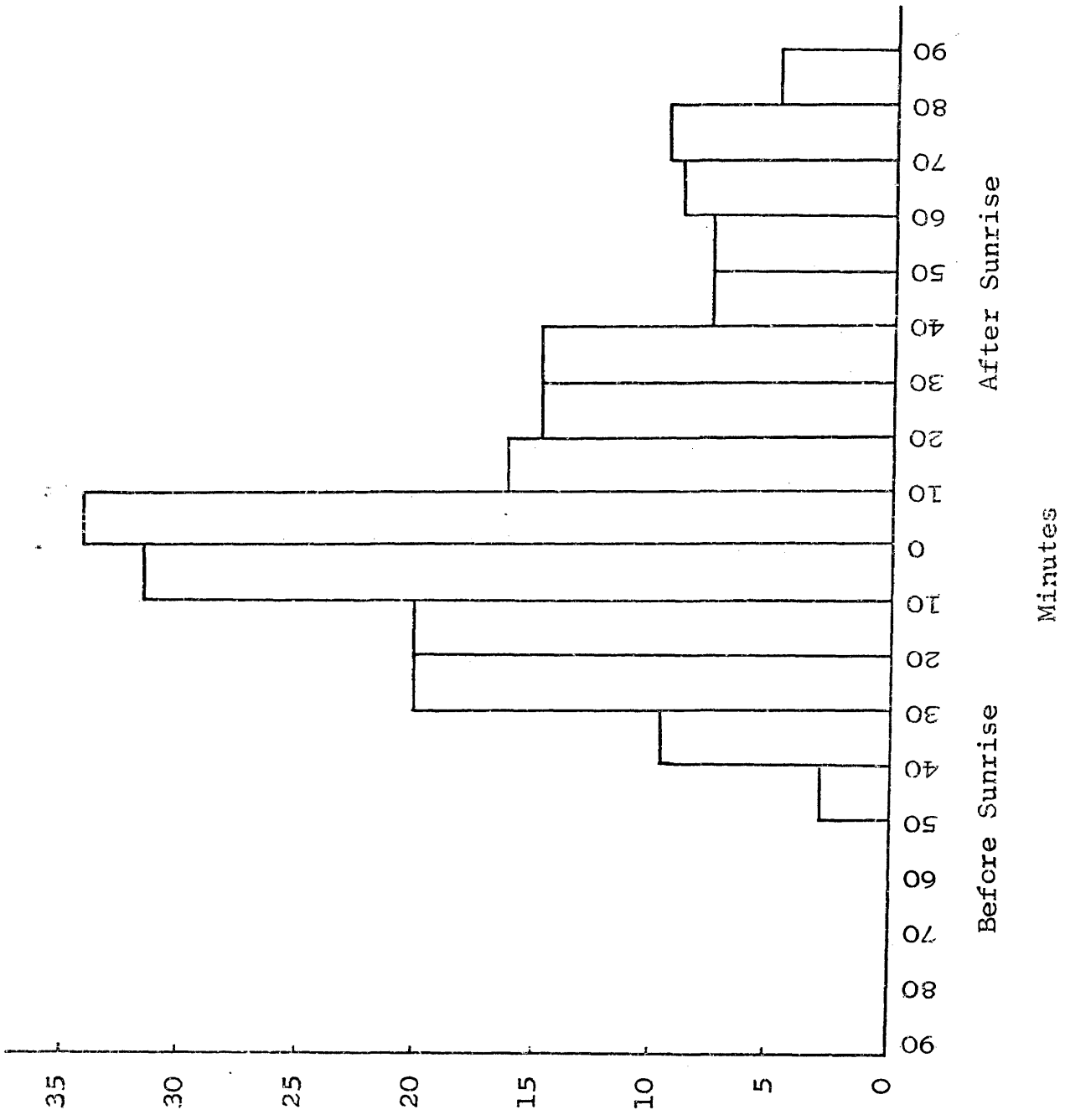
The crowing indices for these two dates were 2.27 and .67. The highest number of individual cocks heard crowing was 27 on April 16. On April 25, sixteen different cocks were heard crowing on Tomahund Plantation, and on April 20, fourteen individual cocks were heard crowing on Sandy Point proper. Both these figures, 16 and 14, were highs during the census. Table 7 shows that the most active crowing took place in the last two weeks of April and tapered off to a .67 crowing index by the end of May. Some sporadic crowing occurred in June. The lowest temperature at the start of the census was 34°F and the highest at the conclusion was 59°F. The mean temperature during the entire period was 48°F.

On May 10, 12, and 14, 1971, a census was taken to determine the time of the greatest daily crowing activity. The earliest call heard was approximately 50 minutes before sunrise. The crowing sometimes continued up to 3 1/2 hours after sunrise. The majority of crowing calls occurred between 10 minutes before sunrise to 10 minutes after sunrise. Daily crowing activity was 31.3 for the time interval, from 10 minutes to sunrise. The highest activity was 34 calls per 10 minutes from sunrise to 10 minutes after sunrise. The increase and decline in intensity before and after this period is demonstrated in Figure 3. Variation in the frequency of crowing among individual cocks was also observed. On May 14, one cock crowed 16 times, while another crowed three times during the same 20-minute period.

The data in Figure 3 do not agree with the findings of Nelson, Buss, and Baines (1962) in Washington or Hardy (1963b) in Tennessee. In both cases the highest daily crowing activity was from 30 to 20 minutes before sunrise. Taber (1949) found that in a 349-acre marsh

Figure 3

Peak daily crowing activity based on the average number of calls heard during ten minute intervals from one counting station on Tomahund Plantation over a three day period in the second week of May 1971.


90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
Before Sunrise
After Sunrise
Minutes
35
30
25
20
15
10
5
0
No. Crowing Calls Per 10 Minute Intervals

area in Dane County, Wisconsin, that a typical crowing peak was reached 40 minutes before sunrise and then declined rapidly. He also reported that there was a great deal of variation due to the weather conditions. This was shown by a decline in the number of cocks crowing on either windy, cold, or cloudy mornings. Kozicky (1952) in Iowa supported Taber's work showing a high degree of variability between counts.

Nest Counts

During the study, only two nests have been reported by landowners. These were found incidental to other activities such as plowing under wheat in June of 1970 and cutting hay in July of 1970. The nests in the wheat and hay contained 12 and 10 eggs respectively. No nests were found by the observer.

On June 11, 1971, a young pheasant was picked up by a farmer while plowing under barley at night. By using the data in Table 11 of the Appendix, the age of the bird was estimated to be approximately three weeks and probably hatched around May 22. Buss, Meyer and Kabat (1951) reported that since the average early clutch size is about 13 eggs and the incubation period is about 23 days, forty days would be the minimum length of time between the laying of the first egg and the hatching date. Therefore, the hen that produced the three-week-old pheasant probably would have started laying in the third week of April, between the 15th and the 19th.

Crop and Land-use Practices

The general type of farming on the Sandy Point area appears to be excellent for the successful establishment of the hybrid pheasant. A detailed discussion of the land and the land-use practices has been

entered earlier in this paper in the section describing the study areas.

The results in Table 17 and 18 of the Appendix show that the acreage of crops with the type of land-use in a landowner's farm totals more than the actual acreage of his farm. This is because the farmers double crop. Land which is planted in wheat, barley, or oats is harvested and then immediately planted in soybeans or milo. Sometimes the land is left in summer fallow in an attempt to combat the spread of Johnson's Grass which causes a great deal of destruction to crops. No attempts were done to add up the amount and percentage of crops and land-use for each individual farm since in most cases, for the reasons stated above, it came to more than 100 per cent.

The results in Table 8 show that the amount of crops grown has not changed substantially over the past two years. About 53 per cent of the land consists of woods which prevents the pheasant from readily dispersing. Small grain, such as wheat, barley, grain sorghum, milo, and oats, is planted on 26.7-29.2 per cent of the land. Soybeans, the largest single crop, was planted on 23.4 per cent of the area in 1970 and 20.9 per cent in 1971. Corn which is the main staple in the diet of pheasants in their range in this country represented only 7 per cent. There was an increase of 175 acres of land left in summer fallow in 1971 as compared with 1970. Also pasture showed an increase from 227 acres to 381 acres. Since 1958, the general trend has been to plant approximately the same amount of crops each year.

A crop-rotation plan of three years was generally followed, resulting in a need for more fertilizer in order to keep the soil productive. For each crop the amount of fertilizer per acre is generally

TABLE 8

Crop and Land-Use Data-1970-1971
Summary Table

Crops and Land-use	1970 Acres	%	1971 Acres	%
Corn	358.0	7.3	327.5	6.6
Soybeans	1152.0	23.4	1029.0	20.9
Grain-Total	1437.0	29.2	1313.0	26.7
1. Wheat	692.0	14.0	610.0	12.4
2. Barley	615.0	12.5	583.0	11.8
3. Grain Sorghum	2.0	.1	3.0	.1
4. Milo	93.0	1.9	57.0	1.2
5. Oats	35.0	.7	60.0	1.2
Hay-Total	44.0	.9	44.0	.9
1. Sericea lespedeza	35.0	.7	35.0	.7
2. Clover	9.0	.2	9.0	.2
Pasture	227.0	5.6	381.0	7.7
Woods	2633.0	53.4	2583.0	52.4
Idle Land	170.0	3.5	162.5	3.3
Summer Fallow	101.0	2.0	275.0	5.6
Miscellaneous (hedgerows, houses, fencerows; roads)	95.0	1.9	85.0	1.7
Total Acreage of Farm's	4927.0		4927.0	

the following: for small grain, 30 pounds of nitrogen, 50-200 pounds of phosphate, and 50-200 pounds of potash are spread at the first planting. Near the first of the year, 70-100 pounds of nitrogen is spread on the small grain. During the planting of corn, 150 pounds of nitrogen, 100 pounds of phosphate, and 100 pounds of potash is applied to the land. For milo, 100 pounds of nitrogen is put on after the small grain is harvested. Soybeans do not need any fertilizer. Every two or three years a ton of lime which is very high in calcium content, is spread on every acre of tillable land.

Even though the amounts and type of crops seem to be beneficial to the pheasants, there have been some detrimental practices during the past 13 years. In the middle of the 1960's, the clearing of fields, hedgerows, fencerows, woodlots, and idle thickets was most extensive. Not only did this result in a continuous loss of food, cover, and roosting sites, but also presented a very serious threat to the survival of the pheasants. In the last three years, especially in 1971, there has been an increase in pasture land. If the pasture land is not grazed too intensively, it will give the pheasants more available habitat for nesting, and the effect of the decrease in hedgerows, etc., may be counterbalanced.

Plowing under of small grain at night in the middle of June, 1971, accounted for the loss of at least four, three-week-old chicks. This practice could be very detrimental to the pheasant population. Some mowing has occurred during the nesting season, and has accounted for the destruction of eggs and the death of hens.

The amount of waste grain remaining from the harvesting of certain crops is small. Immediately after the small grain is harvested,

soybeans or milo is planted. On some occasions, the corn stalks have been plowed under the same day it was harvested. Of all the farmers, only Arthur Hofmeyer uses no-tillage farming, and subsequently his land supports a high concentration of pheasants (Table 1).

Trapping

Although there appeared to be between 10 and 15 pheasants in the trapping area, the trapping was not successful. This was due to the lack of pheasant concentration and the low pheasant population in the Peterson field during the trapping period. Also, the weather influenced the success of the trapping as the winter was not severe enough to drive the pheasants into the trap for feed. Only once was the ground covered with snow. It measured one inch and lasted approximately five hours. The average high temperature during this period was 53.4 degrees, and the average low temperature was 32.9 degrees. A plentiful amount of both cover and feed existed for the pheasants. Although on February 27, one cock was flushed 30 feet from the trap, no observations were reported of pheasants being seen eating the bait. Small birds, such as sparrows and mockingbirds, consumed the majority of the bait.

Since winter weather is not severe enough to drive the pheasants into the trap in search of food, which apparently is abundant, it is not feasible to trap in the Sandy Point area to acquire naturalized birds for use elsewhere in the pheasant stocking program.

Other Wildlife Observations

Detailed data regarding numbers observed of each species in each month is presented in Table 19 of Section D in the Appendix.

The Summary Table 9 shows the total number of individual species for the entire study period.

Twenty-eight different species or subspecies of wildlife were observed on Sandy Point with a total of 5490 animals. Approximately 80 per cent of the wildlife seen consisted of bobwhite quail, mourning doves, gulls, and rabbits. The quail and doves were abundant in every month except December when only two days were spent in the field. Rabbits were most common in the summer and early fall of 1970. Wild turkeys were seen in the woods bordering Sandy Point on three different occasions. Sparrow and marsh hawks were the most commonly observed species of hawks. Sixteen of the marsh hawks which were observed in April, 1971, consisted of 12 females and 4 males. Although 36 foxes were trapped out of the area in 1969 and 1970, foxes had not been observed since the study was conducted only in the daylight hours. Residents of Sandy Point recorded only three foxes sighted during 1970 and 1971.

During this study, 1291 quail observations were recorded in 193 man-hours worked. These data are potentially useful in that it may be relevant to the question of whether populations of pheasants and quail can successfully coexist on the same area.

Food Habits

When the crop contents were analyzed, only three crops were found to contain food material. Soybeans were present in all three crops, while only one contained 1.41 grams and 58 seeds of milo. The number of soybeans ranged from 18 to 160 and their weights varied from 3.22 gr. to 18.29 gr. Due to the small size of the sample, the data do not give an accurate picture of the food habits of the pheasants

TABLE 9

Observations of Other Wildlife (1970-1971) - Summary Table

Species Common Name	Species Scientific Name	Number Observed
Bobwhite Quail	Colinus virgianus virginianus	1291
Cottontail Rabbit	Sylvilagus floridanus	506
Mourning Dove	Zenaidura macroura carolinensis	1261
White-tail Deer	Odccoileus virginianus	149
Opossum	Didelphis virginiana	2
Raccoon	Procyon lotor	5
Woodchuck	Marmota monax	58
Gray Squirrel	Sciurus carolinensis	18
Gulls	Larus atricilla & Larus argentatus smithsonianus	1337
White Ibis	Guara alba	1
Egrets	Casmerodius albus egretta & Leucophoyx thula thula	7
Herons	Nyctanassa violacea & Florida coerulea coerulea	20
Turkey Vulture	Cathartes aura septentrionalis	141

TABLE 9 (continued)

Species Common Name	Species Scientific Name	Number Observed
Killdeer	Charadrius vociferus vociferus	64
Rock Dove	Columba livia	108
Turkey	Meleagris gallopavo silvestris	12
Geese	Branta canadensis canadensis	99
Crow	Corvus brachyrhynchos brachyrhynchos	242
Wilson's Snipe	Capella gallinago delicata	11
Red-Tailed Hawk	Buteo jamaicensis borealis	8
Sparrow Hawk	Falco sparverius sparverius	18
Red-shouldered Hawk	Buteo lineatus lineatus	1
Marsh Hawk	Circus cyaneus hudsonius	19
Hawk (unknown)	----------	9
Ducks	Anas rubripes & Anas strepera	63
Woodcock	Philohela minor	1
Total		5490

in the Sandy Point area. The four birds whose crops were empty were killed early in the morning, and therefore, can be assumed to have had no chance to feed. The three birds which were killed in the early afternoon were shot in soybean fields, thus accounting for the large amount of soybeans in their crops. If it had been possible to have obtained the gizzards, more food items may have been found.

From the forms that were filled out by the hunters, it was learned that the average weight of the nine cocks was 1216 grams, the largest bird weighing approximately 3 pounds. Six cocks were adult and three were juvenile. In this case, juvenile refers to the fact that they hatched out in the spring or summer of 1970. Hedgerows, pig pens, pasture, thickets, and soybean fields were utilized as habitat. Five pheasants were killed on Tomahund Plantation where there seems to be a strong concentration of birds. The four pheasants which were shot on the Sandy Point proper were killed over a widely scattered area. One bird was shot on M. R. Dotson's property, one on Lem Smith's and two on Adolph Hula's.

Climatic Influences

The climate of the area during the study period is characterized by a mean annual precipitation of 46 inches and a mean annual temperature of 58.8°F. Table 20 of the Appendix gives the daily maximum and minimum temperatures for the study period. The warmest day recorded was 96°F on August 2, 1970. The coldest temperature was 13°F on both January 21 and February 1, 1971. Summary Table 10 presents the monthly weather data.

According to the climatological data for the Williamsburg Weather Station, from 1967 through 1970, the mean annual temperatures

TABLE 10

Temperature Data (June 1970-June 1971)
Summary Table

Average Temperatures	June	July	August	September	October	November	December
Maximum	87.2	87.0	88.7	84.5	70.2	59.5	50.1
Minimum	62.8	67.8	67.4	60.5	49.4	37.6	29.5

Average Temperatures	January	February	March	April	May	June	Average Annual Temperature
Maximum	43.3	51.9	54.6	68.3	74.2	84.6	58.8
Minimum	25.9	31.2	35.5	39.2	53.1	65.6	

ranged from 57.0°F to 58.3°F; the mean annual rainfall was 41.85 inches (U.S. Department of Commerce. Weather Bureau 1967-1970).

Humidity recordings were discontinued in the middle of September because of the improper functioning of the humidity needle. During the time the area was visited in the afternoon and early evening, the humidity ranged between 30 and 80 per cent. Fewer birds were seen on hot and humid (70-80 per cent humidity) days than on those days which were hot but not so humid (30-40 per cent humidity).

Climatic influences on the pheasants were difficult to evaluate. The climate very likely affected the time of the breeding season and the amount of productivity. Probably the most important aspect of the weather was its affect on the landowner's farming operations. The weather determined the planting, plowing, mowing, and harvesting activities. The cutting of barley usually occurred in the first week of June, and wheat was cut around the last two weeks of June. The later the harvest, the greater the chances were of a better hatch of young pheasants occurring. The harvesting of barley in 1965 and 1968 verifies this point. The harvest was earlier than usual, in the third week of May, and consequently, a large number of nests and young pheasants were reported destroyed.

GENERAL DISCUSSION

It is felt that the study area supports an established population of pheasants, a conclusion which has been supported by Game Biologists and Foreign Game Investigation program personnel. During 1970-1971 study, 987 pheasant observations were recorded. However, the total population size for the study area can probably be estimated to range between 90 and 120 pheasants.

In order to estimate pheasant population sizes, the fall or winter sex ratio and the total number of individual cocks heard crowing during the spring crowing census must be known. The fall flushing count census that was conducted in 1969 by Settle (1971) revealed a sex ratio of 3 hens to 1 cock. The data that were collected from the 1970 census cannot be depended upon in determining a fall sex ratio for that year because the observers were not allowed on Tomahund Plantation, and a major portion of the population is located on that plantation.

Results from Table 7 show that approximately 27 individual cocks were crowing on April 16 in the entire study area. On April 25, 16 different cocks were recorded crowing on Tomahund Plantation, and on April 20, 14 individual cocks were crowing on Sandy Point proper. Therefore, there would appear to be approximately 30 cocks on the entire Sandy Point area. Using both the sex ratio from 1969 and the number (30) of individual cocks crowing in the spring of 1971, the

estimated population may be determined to be 120 pheasants. This is an estimate of the maximum number of pheasants and a more reasonable estimate of the population would range between 90 and 100, based on field observations, because in the spring of 1971 the ratio of hens to cocks was nearer to 2:1 than to the 3:1 ratio found in the fall of 1969.

Table 5 shows that there was a definite increase in average brood size from 1970 (2.8) to 1971 (6.5). However, these figures are misleading and do not foretell a substantial increase in the population. The broods observed in the latter part of the summer in 1970 show a decrease in the average brood size, as compared with the counts early in the summer, and if this study had continued into the summer of 1971, the brood sizes counted in the spring would probably also show a definite decrease. Dale (1956) reported that because of the high mortality rate among the chicks due to predators and negligent land-use practices, the average brood is reduced considerably below the original size by fall.

Nelson (1964) presented data on a total of 526 broods which contained 4224 chicks from his areas in Kentucky. The average brood size was 8.0. A steady decline in the number of broods seen was noted in a four-year period after the last release in 1956, but Nelson concluded that brood size and number of eggs per clutch (based on a limited number of nest studies) were normal. Yet attempts to introduce pheasants in Kentucky have failed. The exact reasons are not clear.

Brood data presented from Tennessee (1964-1969) includes 91 broods with an average brood size of 7.2 (Hines 1970). Anderson

(1964) carried out studies in Illinois south of the established pheasant range. In 1960, 52 broods were observed with a mean size of 7.4 chicks per brood. In both cases, attempts to establish permanent pheasant populations were not successful.

The data in Table 5 do not agree with the findings of Nelson (1964), Hines (1970), and Anderson (1964). The average brood sizes were low, but even so it is likely that the breeding population is producing enough broods per year to sustain itself in the Sandy Point area.

The habitat utilized in the summer and fall by the pheasants on the Sandy Point area are different from those found in Kentucky (Nelson 1964, 1968). There, pheasants were mainly seen in corn fields and only seen 2 per cent of the time in soybeans. However, in the Sandy Point area, the reverse was true. Figure 2 shows that approximately 30 per cent of the pheasants observed in the spring and fall were in soybean fields while the corn fields were not utilized to any great extent. Nelson (1964) reported that corn is available all year round and in large quantities whereas soybean fields are at a minimum. The landowners of Sandy Point plant approximately 330 acres in corn and 1100 acres in soybeans each year (Table 8). The relatively greater availability of soybean fields at Sandy Point may explain in part the difference in behavior of the two populations (Kentucky and Sandy Point). There are insufficient data on food habits of Sandy Point birds to relate food and habitat preferences, but it is presumed that food is plentiful, as evidenced the the failure of baited traps to attract the birds during the winter, when food is presumably least abundant.

A number of theories have been formulated concerning the reasons pheasants have not become established in sections south of the 40th parallel. Excessively high air temperatures during pre-incubation period, lack of calcium, predation by foxes, hawks, and poachers, decrease in the amount of cover, and the change in land-use practices are some of the factors that have been blamed for failure of establishment.

Yeatter (1950) found that exposure of eggs to high pre-incubation air temperatures between 78° and 83°F for nine hours a day during a consecutive seven-day period showed a decline in hatchability. Ellis and Anderson (1963) using a high temperature of 79°F, experienced a decline in hatchability. Nelson (1964) reported in his study two cases of incubation periods during which the air temperatures were 80°F or above for seven consecutive days or longer in the pre-incubation period. Hatching success was 83.3 per cent in the first case and 90.9 per cent in the second. Nelson (1964) concluded from nest temperature studies that high air temperatures during the pre-incubation period were not an extremely important factor affecting reproduction.

The majority of the nesting occurs in April and May, and in Table 20 of the Appendix, the data for those two months show that the air temperature never reached a critical point for any length of time. Therefore, it is unlikely that high air temperatures during the pre-incubation period affected the hatch in the Sandy Point area.

A calcium deficiency in the soil appears to prevent the establishment of pheasants in the eastern and southern portion of the United States (Robinson 1958). Calcium is vital in reproduction, growth, and other physiological processes in birds (Labisky et al. 1964).

Romanoff and Romanoff (1949) reported that about 98.2 per cent (2.2 grams) of the shell of the egg laid by a domestic hen consists of calcium and approximately 6.0 per cent of the contents of the egg is calcium. This calcium comes from either the daily diet of the hen or from her body reserves of calcium.

However, the findings of this study appear to indicate that calcium is not a limiting factor in the Sandy Point area. An ample supply of calcium is provided by numerous sea shells originally from the James River, by limestone found on the edge of county roads and in driveways, and by artificial alkalinization of the soil every two or three years with lime ($CaCO_3$).

In 1967 and 1968, the inhabitants of Sandy Point felt that there was a definite decrease in the number of birds seen. They attributed the decrease to the predation of foxes and to the land-use changes on the 13-acre Sericea lespedeza field in the northern part of the study area. These two factors probably did contribute to the decrease in the pheasant population, but more likely the primary factor was the extensive clearing and cleaning of fields, hedgerows, fencerows, woodlots, and idle thickets. Not only did this result in a continuous loss of food, cover, and roosting sites, but also presented a very serious threat to the survival of the pheasant. During the past three years, however, there has been a tendency to put more land into pasture, to create more ditchbanks, and to leave hedgerows standing. This may well account for the apparent increase in the population size over the last two years. The Sandy Point population is well established and of a viable size, and barring some changes in

land-use practices, excessive hunting, or poaching, it will probably maintain itself in the Sandy Point area indefinitely.

APPENDIX

Section A - Age Characteristics of Juvenile Pheasants

Section B - Habitat Data

Section C - Crop and Land-Use Data

Section D - Observations of Other Wildlife

Section E - Weather Data

Section F - Census Method Forms

Section G - Inhabitants of the Sandy Point Area

SECTION A

Age Characteristics of Juvenile Pheasants

TABLE 11

Age Characteristics of Juvenile Pheasants Used For Determining Age of Broods in 1971*

Age	Sex	Height	Tail Length
1 week	Both	3 inches	Feathers just started
2 weeks	Both	4 inches	1/2 inch
3 weeks	Both	5 inches	1 1/2 inches
4 weeks	Both	7 inches	2 inches
5 weeks	Both	7 1/2 inches	2 1/2 inches
6 weeks	Both	8 inches	2 3/4 inches
7 weeks	Cocks	9 inches	3 inches
8 weeks	Cocks	10 inches	3 1/2 inches
9 weeks	Cocks	11 inches	4 inches
10 weeks	Cocks	12 inches	4 inches (Post-juvenile molt)
11 weeks	Cocks	13 inches	5 1/2 inches
12 weeks	Cocks	14-14 1/2 inches	6 1/2 inches

*Wagner et al. (1965)

SECTION B

Habitat Data

TABLE 12

Habitat Occupied by Observed Pheasants in the Summer of 1970

Habitat Type	Number of Observations Per Habitat Type By Landowner's Area					
	J. C. Smith	M. R. Dotson	Garrison	Peterson	S. Hula Sr.	R. Dotson
Corn	-	-	-	-	-	-
Soybeans	-	9	13	-	2	-
Grains:	1	16	-	-	6	-
wheat	-	-	-	-	-	-
barley	-	-	-	-	-	-
grain sorghum	-	-	-	-	-	-
milo	(1)*	-	-	-	-	-
grain stubble	-	(16)	-	-	(6)	-
Hay:	-	-	-	-	-	-
Sericea lespedeza	-	-	-	-	-	-
Clover	-	-	-	-	-	-
hay stubble	-	-	-	-	-	-
Idle land:	-	1	-	9	-	-
weed & broomsedge	-	-	-	-	-	-
briar thickets	-	(1)	-	-	-	-
Johnson's grass	-	-	-	(9)	-	-
Pastures	-	-	-	-	-	-
Plowed fields	-	-	-	-	-	-
Woods:	2	-	1	-	-	-
deciduous	-	-	-	-	-	-
pine	-	-	-	-	-	-
mixed	(2)	-	(1)	-	-	-
Fencerows	-	-	-	-	-	-
Hedgerows	-	1	1	-	-	-
Ditchbanks	-	-	-	-	2	-
Barnyards	-	2	-	-	-	-
Pig Pens	-	-	-	-	-	-
Roads:	-	1	3	2	5	1
medium duty	-	(1)	(2)	-	(5)	(1)
unimproved	-	-	(1)	(2)	-	-
Totals	3	30	18	11	15	1

* () represent subtotals

TABLE 12 (continued)

Habitat Type	Number of Observations Per Habitat Type by Landowner's Area						
	L. Smith	A. Hula	Ruffin	Bayview	Hofmeyer	Total	% of Total
Corn	2	-	-	-	3	5	1.8
Soybeans	1	4	45	-	14	88	32.4
Grains:	-	-	8	-	-	26	11.4
wheat	-	-	-	-	-	-	-
barley	-	-	-	-	-	-	-
grain sorghum	-	-	-	-	-	-	-
milo	-	-	(8)*	-	-	(9)	-
grain stubble	-	-	-	-	-	(22)	-
Hay:	7	-	-	-	-	7	2.6
Sericea lespedeza	(3)	-	-	-	-	(3)	-
Clover	(4)	-	-	-	-	(4)	-
hay stubble	-	-	-	-	-	-	-
Idle land:	12	-	3	-	3	28	10.3
weed & broomsedge	-	-	-	-	-	-	-
briar thickets	(8)	-	(3)	-	(3)	-	-
Johnson's grass	(4)	-	-	-	-	-	-
Pastures	21	-	-	-	-	21	7.7
Plowed fields	4	-	22	-	-	26	9.6
Woods:	-	-	-	-	2	5	1.8
deciduous	-	-	-	-	(2)	-	-
pine	-	-	-	-	-	-	-
mixed	-	-	-	-	-	-	-
Fencerows	-	1	-	-	1	2	.7
Hedgerows	1	-	18	-	2	23	8.5
Ditchbanks	-	-	-	-	-	2	.7
Barnyards	-	-	3	-	-	5	1.8
Pig Pens	-	-	-	-	-	-	-
Roads:	11	3	-	-	3	29	10.7
medium duty	(11)	(3)	-	-	(3)	-	-
unimproved	-	-	-	-	-	-	-
Totals	59	8	98	-	28	272	100%

* ( ) represent subtotals

TABLE 13

Habitat Occupied by Observed Pheasants in the Fall of 1970

Habitat Type	Number of Observations Per Habitat Type by Landowner's Area					
	J. C. Smith	M. R. Dotson	Garrison	Peterson	S. Hula Sr.	R. Dotson
Corn	-	-	-	-	-	-
Soybeans	-	3	1	-	3	-
Grains:	-	-	-	-	-	-
wheat	-	-	-	-	-	-
barley	-	-	-	-	-	-
grain sorghum	-	-	-	-	-	-
milo	-	-	-	-	-	-
grain stubble	-	-	-	-	-	-
Hay:	-	-	-	-	-	-
Sericea lespedeza	-	-	-	-	-	-
Clover	-	-	-	-	-	-
hay stubble	-	-	-	-	-	-
Idle land:	-	-	-	28	-	-
weed & broomsedge	-	-	-	(7)*	-	-
briar thickets	-	-	-	(13)	-	-
Johnson's grass	-	-	-	(8)	-	-
Pastures	-	-	-	-	-	-
Plowed fields	-	3	-	-	-	-
Woods:	1	-	1	5	-	1
deciduous	-	-	-	-	-	-
pine	-	-	-	(5)	-	-
mixed	(1)	-	(1)	-	-	(1)
Fencerows	-	-	-	-	-	-
Hedgerows	-	-	-	1	-	-
Ditchbanks	-	-	-	-	-	-
Barnyards	-	-	-	-	-	-
Pig Pens	-	-	-	-	-	-
Roads:	-	-	-	4	1	2
medium duty	-	-	-	(4)	-	(2)
unimproved	-	-	-	-	(1)	-
Totals	1	6	2	38	4	3

* () represent subtotals

TABLE 13 (continued)

Habitat Type	Number of Observations Per Habitat Type by Landowner's Area						
	L. Smith	A. Hula	Ruffin	Bayview	Hofmeyer	Total	% of Total
Corn	-	-	-	-	17	17	5.3
Soybeans	-	-	2	1	76	86	27.5
Grains:	-	-	1	-	13	14	4.3
wheat	-	-	-	-	-	-	-
barley	-	-	-	-	-	-	-
grain sorghum	-	-	-	-	(7)	(7)	-
milo	-	-	(1)*	-	(6)	(7)	-
grain stubble	-	-	-	-	-	-	-
Hay:	1	-	-	-	-	1	.3
Sericea lespedeza	(1)	-	-	-	-	(1)	-
Clover	-	-	-	-	-	-	-
hay stubble	-	-	-	-	-	-	-
Idle land:	7	-	-	-	11	46	14.4
weed & broomsedge	-	-	-	-	-	(7)	-
briar thickets	(7)	-	-	-	(4)	(24)	-
Johnson's grass	-	-	-	-	-	(8)	-
Pastures	4	-	-	-	-	4	1.2
Plowed fields	-	-	2	-	3	8	2.5
Woods:	22	-	-	-	15	45	14.2
deciduous	(22)	-	-	-	(10)	(37)	-
pine	-	-	-	-	(4)	(4)	-
mixed	-	-	-	-	(1)	(4)	-
Fencerows	1	-	-	-	9	10	3.3
Hedgerows	-	-	-	-	13	14	4.3
Ditchbanks	-	-	-	-	-	-	-
Barnyards	-	-	-	-	-	-	-
Pig Pens	-	-	-	-	-	-	-
Roads:	2	3	3	-	57	72	22.7
medium duty	(1)	(2)	-	-	(17)	(26)	-
unimproved	(1)	(1)	(3)	-	(40)	(46)	-
Totals	37	3	8	1	214	317	100%

* () represent subtotals

TABLE 14

Habitat Occupied by Observed Pheasants in the Winter of 1970

Habitat Type	Number of Observations Per Habitat Type by Landowner's Area					
	J. C. Smith	M. R. Dotson	Garrison	Peterson	S. Hula Sr.	R. Dotson
Corn	-	-	-	-	-	-
Soybeans	-	-	-	-	-	-
Grains:	-	4	-	-	-	-
wheat	-	(4)*	-	-	-	-
barley	-	-	-	-	-	-
grain sorghum	-	-	-	-	-	-
milo	-	-	-	-	-	-
grain stubble	-	-	-	-	-	-
Hay:	-	-	-	-	-	-
Sericea lespedeza	-	-	-	-	-	-
Clover	-	-	-	-	-	-
hay stubble	-	-	-	-	-	-
Idle land:	-	-	-	30	-	-
weed & broomsedge	-	-	-	(22)	-	-
briar thickets	-	-	-	(8)	-	-
Johnson's grass	-	-	-	-	-	-
Pastures	-	-	-	-	-	-
Plowed fields	-	-	-	-	-	-
Woods:	-	-	-	2	-	1
deciduous	-	-	-	(2)	-	-
pine	-	-	-	-	-	-
mixed	-	-	-	-	-	(1)
Fencerows	-	-	-	-	-	-
Hedgerows	-	-	8	13	-	-
Ditchbanks	-	2	-	-	1	-
Barnyards	-	-	-	-	-	-
Pig Pens	-	-	-	-	-	-
Roads:	-	-	-	-	-	-
medium duty	-	-	-	-	-	-
unimproved	-	-	-	-	-	-
Totals	-	6	8	45	1	1

* () represent subtotals

TABLE 14 (continued)

Habitat Type	Number of Observations Per Habitat Type by Landowner's Area						
	L. Smith	A. Hula	Ruffin	Bayview	Hofmeyer	Total	% of Total
Corn	-	-	-	-	-	-	-
Soybeans	-	-	-	-	-	-	-
Grains:	5	-	1	-	4	14	17.9
wheat	(1)*	-	-	-	-	(5)	-
barley	(4)	-	-	-	-	(4)	-
grain sorghum	-	-	-	-	-	-	-
milo	-	-	-	-	(4)	(4)	-
grain stubble	-	-	(1)	-	-	(1)	-
Hay:	-	-	-	-	-	-	-
Sericea lespedeza	-	-	-	-	-	-	-
Clover	-	-	-	-	-	-	-
hay stubble	-	-	-	-	-	-	-
Idle land:	-	-	-	-	3	33	42.4
weed & broomsedge	-	-	-	-	-	(22)	-
briar thickets	-	-	-	-	(3)	(11)	-
Johnson's grass	-	-	-	-	-	-	-
Pastures	-	-	-	-	-	-	-
Plowed fields	-	-	-	-	-	-	-
Woods:	-	-	-	-	-	3	3.8
deciduous	-	-	-	-	-	(2)	-
pine	-	-	-	-	-	-	-
mixed	-	-	-	-	-	(1)	-
Fencerows	1	-	-	-	-	1	1.3
Hedgerows	-	-	1	-	1	23	29.5
Ditchbanks	-	-	-	-	-	3	3.8
Barnyards	-	-	-	-	-	-	-
Pig Pens	-	-	-	-	-	-	-
Roads:	-	1	-	-	-	1	1.3
medium duty	-	-	-	-	-	-	-
unimproved	-	(1)	-	-	-	(1)	-
Totals	6	1	2	-	8	78	100%

* () represent subtotals

TABLE 15

Habitat Occupied by Observed Pheasants in the Spring of 1971

Habitat Type	Number of Observations Per Habitat Type by Landowner's Area					
	J. C. Smith	M. R. Dotson	Garrison	Peterson	S. Hula Sr.	R. Dotson
Corn	-	-	-	-	-	-
Soybeans	-	-	-	-	-	-
Grains:	2	6	-	-	27	-
wheat	-	(2)*	-	-	(20)	-
barley	-	(4)	-	-	(7)	-
grain sorghum	-	-	-	-	-	-
milo	-	-	-	-	-	-
grain stubble	(2)	-	-	-	-	-
Hay:	-	-	-	-	-	-
Sericea lespedeza	-	-	-	-	-	-
Clover	-	-	-	-	-	-
hay stubble	-	-	-	-	-	-
Idle land:	-	-	-	1	-	-
weed & broomsedge	-	-	-	(1)	-	-
briar thickets	-	-	-	-	-	-
Johnson's grass	-	-	-	-	-	-
Pastures	-	-	-	-	-	-
Plowed fields	-	-	-	-	-	-
Woods:	-	-	-	-	3	-
deciduous	-	-	-	-	(3)	-
pine	-	-	-	-	-	-
mixed	-	-	-	-	-	-
Fencerows	-	-	-	-	-	-
Hedgerows	-	-	-	1	-	-
Ditchbanks	2	-	-	-	3	-
Barnyards	-	-	-	-	-	-
Pig Pens	-	-	-	-	-	-
Roads:	-	6	-	1	2	-
medium duty	-	(6)	-	-	(2)	-
unimproved	-	-	-	(1)	-	-
Totals	4	12	-	3	35	-

* () represent subtotals

TABLE 15 (continued)

Habitat Type	Number of Observations Per Habitat Type by Landowner's Area						
	L. Smith	A. Hula	Ruffin	Bayview	Hofmeyer	Total	% of Total
Corn	-	-	-	-	1	1	.3
Soybeans	-	-	-	-	-	-	-
Grains:	25	7	4	-	74	145	51.8
wheat	(9)*	(2)	(2)	-	(33)	(68)	-
barley	(16)	(5)	-	-	(19)	(51)	-
grain sorghum	-	-	-	-	-	-	-
milo	-	-	-	-	(4)	(4)	-
grain stubble	-	-	(2)	-	(17)	(19)	-
Hay:	-	-	-	-	1	1	.3
Sericea lespedeza	-	-	-	-	-	-	-
Clover	-	-	-	-	-	-	-
hay stubble	-	-	-	-	(1)	(1)	-
Idle land:	-	-	-	-	-	1	.3
weed & broomsedge	-	-	-	-	-	(1)	-
briar thickets	-	-	-	-	-	-	-
Johnson's grass	-	-	-	-	-	-	-
Pastures	3	-	-	-	8	11	4.5
Plowed fields	1	-	8	-	-	9	3.2
Woods:	-	-	-	-	3	6	2.2
deciduous	-	-	-	-	(3)	(3)	-
pine	-	-	-	-	-	-	-
mixed	-	-	-	-	-	-	-
Fencerows	8	-	-	-	-	8	2.8
Hedgerows	3	-	10	1	19	34	12.1
Ditchbanks	1	-	-	-	1	7	2.5
Barnyards	1	-	-	-	1	2	.7
Pig Pens	2	-	-	-	5	7	2.5
Roads:	5	7	2	-	25	48	17.1
medium duty	(5)	(5)	-	-	(15)	(33)	-
unimproved	-	(2)	(2)	-	(10)	(15)	-
Totals	49	14	24	1	137	279	100%

* () represent subtotals

TABLE 16

Habitat Occupied by Observed Pheasants in the Summer (June) of 1971

Habitat Type	Number of Observations Per Habitat Type by Landowner's Area					
	J. C. Smith	M. R. Dotson	Garrison	Peterson	S. Hula Sr.	R. Dotson
Corn	-	-	-	-	-	-
Soybeans	-	-	-	-	6	-
Grains:	-	-	-	-	2	-
wheat	-	-	-	-	-	-
barley	-	-	-	-	(2)*	-
grain sorghum	-	-	-	-	-	-
milo	-	-	-	-	-	-
grain stubble	-	-	-	-	-	-
Hay:	-	-	-	-	-	-
Sericea lespedeza	-	-	-	-	-	-
Clover	-	-	-	-	-	-
hay stubble	-	-	-	-	-	-
Idle land:	-	-	-	-	-	-
weed & broomsedge	-	-	-	-	-	-
briar thickets	-	-	-	-	-	-
Johnson's grass	-	-	-	-	-	-
Pastures	-	-	-	-	-	-
Plowed fields	-	-	-	-	-	-
Woods:	-	-	-	-	-	-
deciduous	-	-	-	-	-	-
pine	-	-	-	-	-	-
mixed	-	-	-	-	-	-
Fencerows	-	-	-	-	-	-
Hedgerows	-	-	-	-	-	-
Ditchbanks	-	-	-	-	-	-
Barnyards	-	-	-	-	-	-
Pig Pens	-	-	-	-	-	-
Roads:	-	-	-	-	5	-
medium duty	-	-	-	-	(5)	-
unimproved	-	-	-	-	-	-
Totals	-	-	-	-	13	-

* () represent subtotals

TABLE 16 (continued)

Habitat Type	Number of Observations Per Habitat Type by Landowner's Area						
	L. Smith	A. Hula	Ruffin	Bayview	Hofmeyer	Total	% of Total
Corn	-	-	-	-	1	1	2.4
Soybeans	-	-	-	-	-	6	14.3
Grains:	10	-	-	-	7	19	45.2
wheat	-	-	-	-	-	-	-
barley	-	-	-	-	(7)	(9)	-
grain sorghum	-	-	-	-	-	-	-
milo	-	-	-	-	-	-	-
grain stubble	(10)*	-	-	-	-	(10)	-
Hay:	-	-	-	-	-	-	-
Sericea lespedeza	-	-	-	-	-	-	-
Clover	-	-	-	-	-	-	-
hay stubble	-	-	-	-	-	-	-
Idle land:	-	-	-	-	-	-	-
weed & broomsedge	-	-	-	-	-	-	-
briar thickets	-	-	-	-	-	-	-
Johnson's grass	-	-	-	-	-	-	-
Pastures	-	-	-	-	3	3	7.1
Plowed fields	-	-	-	-	-	-	-
Woods:	-	-	-	-	-	-	-
deciduous	-	-	-	-	-	-	-
pine	-	-	-	-	-	-	-
mixed	-	-	-	-	-	-	-
Fencerows	1	-	-	-	-	1	2.4
Hedgerows	-	-	-	-	-	-	-
Ditchbanks	-	-	-	-	-	-	-
Barnyards	-	-	-	-	-	-	-
Pig Pens	-	-	-	-	-	-	-
Roads:	-	-	-	-	7	12	28.6
medium duty	-	-	-	-	(2)	(7)	-
unimproved	-	-	-	-	(5)	(5)	-
Totals	11	-	-	-	18	42	100%

* () represent subtotals

SECTION C

Crop and Land-Use Data

TABLE 17

Crop and Land-Use Data-1970

Crops and Land-Use	J. C. Smith		M. R. Dotson		Wilkerson		Garrison		S. Hula Sr.	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Corn	-	-	25	13.4	35	8.8	27	18.0	57	8.9
Soybeans	-	-	75	40.3	-	-	52	34.7	265	41.4
Grain-Total	22	44.0	72	38.7	59	14.8	52	34.7	276	43.1
1. Wheat	8	16.0	11	5.9	-	-	25	16.7	115	17.9
2. Barley	6	12.0	61	32.8	40	10.0	27	18.0	161	25.2
3. Grain Sorghum	-	-	-	-	-	-	-	-	-	-
4. Milo	8	16.0	-	-	19	4.8	-	-	-	-
5. Oats	-	-	-	-	-	-	-	-	-	-
Hay-Total	-	-	-	-	-	-	-	-	-	-
1. Sericea lespedeza	-	-	-	-	-	-	-	-	-	-
2. Clover	-	-	-	-	-	-	-	-	-	-
Pasture	-	-	-	-	-	-	-	-	26	4.1
Woods	26	52.0	50	26.3	316	79.0	66	44.0	255	39.8
Idle Land	7	14.0	13	7.0	2	.5	-	-	-	-
Summer Fallow	6	12.0	-	-	21	5.3	-	-	9	1.4
Miscellaneous (hedgerows, fencerows, houses; roads)	3	6.0	23	12.4	7	1.7	5	3.3	26	4.1
Total Acreage of Farm	50		186		400		150		640	

TABLE 17 (continued)

Crops and Land-Use	L. Smith		A. Hula		Ruffin		Bayview		Hofmeyer	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Corn	59	9.8	75	7.9	-	-	-	-	80	9.1
Soybeans	90	15.0	375	40.1	80	20.0	80	12.5	135	15.4
Grain-Total	148	24.6	390	41.7	188	47.0	90	14.1	140	16.0
1. Wheat	60	10.0	200	21.4	148	37.0	85	13.3	40	4.6
2. Barley	70	11.6	190	20.3	-	-	-	-	60	6.9
3. Grain Sorghum	-	-	-	-	-	-	-	-	2	.2
4. Milo	18	3.0	-	-	40	10.0	5	.8	3	.3
5. Oats	-	-	-	-	-	-	-	-	35	4.0
Hay-Total	15	2.5	25	2.7	-	-	-	-	4	.5
1. Sericea lespedeza	10	1.7	25	2.7	-	-	-	-	-	-
2. Clover	5	.8	-	-	-	-	-	-	4	.5
Pasture	36	6.0	200	21.4	-	-	-	-	15	1.7
Woods	365	60.9	230	24.6	249	62.3	551	86.4	525	60.0
Idle Land	-	-	-	-	-	-	-	-	96	11.0
Summer Fallow	12	2.0	25	2.7	28	7.0	-	-	-	-
Miscellaneous (hedgerows, houses, fencerows; roads)	5	.8	6	.7	3	.7	2	.3	15	1.7
Total Acreage of Farm	600		936		400		638		875	

TABLE 18

Crop and Land-Use Data-1971

Crops and Land-Use	J. C. Smith		M. R. Dotson		Wilkerson		Garrison		S. Hula Sr.	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Corn	-	-	44	23.9	-	-	15.5	10.4	38	5.8
Soybeans	-	-	31	16.7	-	-	54	36.0	279	43.7
Grain-Total	28	56.0	56	30.4	115	28.8	54	36.0	279	43.7
1. Wheat	21	42.0	10	5.4	17	4.3	26	17.3	143	22.4
2. Barley	-	-	46	24.7	58	14.5	28	18.7	136	21.3
3. Grain Sorghum	-	-	-	-	-	-	-	-	-	-
4. Milo	7	14.0	-	-	40	10.0	-	-	-	-
5. Oats	-	-	-	-	-	-	-	-	-	-
Hay-Total	-	-	-	-	-	-	-	-	-	-
1. Sericea lespedeza	-	-	-	-	-	-	-	-	-	-
2. Clover	-	-	-	-	-	-	-	-	-	-
Pasture	-	-	-	-	-	-	-	-	52	8.2
Woods	26	52.0	50	26.3	316	79.0	66	44.0	255	39.8
Idle Land	-	-	13	7.0	2	.5	9.5	6.3	-	-
Summer Fallow	14	28.0	25	13.4	35	8.8	-	-	-	-
Miscellaneous (hedgerows, houses, fencerows; roads)	3	6.0	23	12.4	7	1.7	5	3.3	16	2.5
Total Acreage of Farm	50		186		400		150		640	

TABLE 18 (continued)

Crops and Land-Use	L. Smith		A. Hula		Ruffin		Bayview		Hofmeyer	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Corn	41	6.9	50	5.3	25	6.3	34	5.3	80	9.1
Soybeans	100	16.7	357	38.1	78	19.5	-	-	135	15.4
Grain-Total	130	21.7	425	45.4	86	21.5	-	-	140	16.0
1. Wheat	50	8.4	225	24.0	78	19.5	-	-	40	4.6
2. Barley	80	13.3	200	21.4	-	-	-	-	35	4.0
3. Grain Sorghum	-	-	-	-	-	-	-	-	3	.3
4. Milo	-	-	-	-	8	2.0	-	-	2	.2
5. Oats	-	-	-	-	-	-	-	-	60	6.9
Hay-Total	15	2.5	25	2.7	-	-	-	-	4	.5
1. Sericea lespedeza	10	1.7	25	2.7	-	-	-	-	-	-
2. Clover	5	.8	-	-	-	-	-	-	4	.5
Pasture	54	8.9	200	21.4	-	-	-	-	75	8.6
Woods	365	60.9	230	24.6	249	62.3	551	86.4	475	54.3
Idle Land	-	-	-	-	-	-	-	-	86	9.8
Summer Fallow	20	3.3	93	9.9	37	9.2	51	8.0	-	-
Miscellaneous (hedgerows, houses, fencerows; roads)	5	.8	6	.7	3	.7	2	.3	15	1.7
Total Acreage of Farm	600		936		400		638		875	

SECTION D

Observations of Other Wildlife

TABLE 19

Observations of Other Wildlife 1970-1971

Species	Number Observed						
	July	August	September	October	November	December	January
Bobwhite Quail	131	175	280	141	161	10	35
Cottontail Rabbit	192	151	126	3	2	1	4
Mourning Dove	91	106	129	167	20	5	45
White-tail Deer	58	32	12	7	7	-	3
Opossum	2	-	-	-	-	-	-
Raccoon	1	-	4	-	-	-	-
Woodchuck	22	21	5	3	1	-	-
Gray Squirrel	4	1	-	5	2	-	-
Gulls	14	93	-	-	170	-	-
White Ibis	1	-	-	-	-	-	-
Egrets	1	2	1	-	-	-	-
Herons	10	8	1	1	-	-	-
Turkey Vulture	-	42	4	11	18	-	-
Killdeer	-	-	2	2	30	-	-
Rock Dove	-	-	19	40	33	-	-
Turkey	-	-	6	-	-	-	-
Geese	-	-	-	99	-	-	-
Crow	16	2	25	25	22	6	-
Wilson's Snipe	-	-	-	1	7	-	1
Red-tailed Hawk	-	1	4	1	2	-	-
Sparrow Hawk	-	-	1	2	4	-	-
Red-shouldered Hawk	-	-	-	1	-	-	-
Marsh Hawk	-	-	-	1	-	-	-
Hawk (unknown)	-	-	-	4	-	-	-
Ducks	-	-	-	-	-	-	20
Woodcock	-	-	-	-	-	-	-
Total	543	634	619	514	479	22	108

TABLE 19 (continued)

Species	Number Observed					
	February	March	April	May	June	Total
Bobwhite Quail	70	48	172	43	25	1291
Cottontail Rabbit	9	7	23	22	6	506
Mourning Dove	45	203	312	75	36	1261
White-tail Deer	6	8	15	-	1	149
Opossum	-	-	-	-	-	2
Raccoon	-	-	-	-	-	5
Woodchuck	-	-	3	2	1	58
Gray Squirrel	-	1	2	3	-	18
Gulls	369	95	451	145	-	1337
White Ibis	-	-	-	-	-	1
Egrets	-	-	1	2	-	7
Herons	-	-	-	-	-	20
Turkey Vulture	16	15	27	6	2	141
Killdeer	-	30	-	-	-	64
Rock Dove	-	9	-	-	7	108
Turkey	5	-	-	1	-	12
Geese	-	-	-	-	-	99
Crow	23	55	36	26	5	242
Wilson's Snipe	2	-	-	-	-	11
Red-tailed Hawk	-	-	-	-	-	8
Sparrow Hawk	1	8	2	-	-	18
Red-shouldered Hawk	-	-	-	-	-	1
Marsh Hawk	1	-	16	1	-	19
Hawk (unknown)	-	3	2	-	-	9
Ducks	27	2	14	-	-	63
Woodcock	-	1	-	-	-	1
Total	574	512	1076	326	83	5490

SECTION E

Weather Data

TABLE 20

Temperature Data (June 1970-June 1971)

Daily Temperatures	Dates June 1970*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maximum	86	87	86	84	87	87	84	83	84	86	89	94	90	80	78	88	93	97
Minimum	64	66	66	64	67	61	59	54	54	59	61	62	68	53	55	65	70	72

Daily Temperatures	Dates June 1970 (continued)												Average
	19	20	21	22	23	24	25	26	27	28	29	30	
Maximum	97	97	94	86	82	85	90	83	86	79	83	91	87.2
Minimum	69	69	65	69	66	56	64	67	68	55	53	64	62.8

*Data for June from Climatological Data-Virginia

TABLE 20 (continued)

Daily Temperatures	Dates July 1970*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maximum	88	86	88	94	89	82	86	87	87	81	86	85	87	83	90	90	87	88
Minimum	69	66	68	74	67	62	60	61	70	68	67	66	66	62	68	74	65	61

Daily Temperatures	Dates July 1970 (continued)													Average
	19	20	21	22	23	24	25	26	27	28	29	30	31	
Maximum	89	90	72	80	80	88	90	92	89	90	94	88	91	87.0
Minimum	65	60	64	64	73	74	72	71	70	76	73	72	73	67.8

*Data for July (1-20) from Climatological Data-Virginia (July 1-20), and rest from study area.

TABLE 20 (continued)

Daily Temperatures	Dates August 1970*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maximum	95	96	90	85	86	84	85	86	86	85	88	88	91	89	93	92	91	90
Minimum	73	72	65	62	60	64	67	64	68	68	66	65	65	68	66	71	73	71

Daily Temperatures	Dates August 1970 (continued)													Average
	19	20	21	22	23	24	25	26	27	28	29	30	31	
Maximum	89	90	86	86	86	84	85	85	88	91	93	93	93	88.7
Minimum	69	70	72	63	69	69	63	77	61	65	65	66	71	67.4

*Data for August (19-31) from Climatological Data-Virginia (August 19-31), and rest from study area.

TABLE 20 (continued)

Daily Temperatures	Dates September 1970*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maximum	82	83	86	92	90	87	88	80	80	89	87	78	83	85	89	90	85	90
Minimum	63	55	62	75	70	66	62	54	61	68	58	54	52	61	63	65	66	69

Daily Temperatures	Dates September 1970 (continued)												Average
	19	20	21	22	23	24	25	26	27	28	29	30	
Maximum	78	79	90	93	92	88	90	90	88	68	65	71	84.5
Minimum	55	52	60	69	70	70	67	69	58	40	40	40	60.5

*Data for September (1-6) from Climatological Data-Virginia, and rest from study area.

TABLE 20 (continued)

Daily Temperatures	Dates October 1970*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maximum	71	73	82	63	67	76	77	76	77	82	78	76	78	83	80	60	54	78
Minimum	44	42	61	36	46	47	45	46	55	62	60	54	52	60	58	40	32	33

Daily Temperatures	Dates October 1970 (continued)													Average
	19	20	21	22	23	24	25	26	27	28	29	30	31	
Maximum	78	61	64	69	69	72	68	67	55	56	60	61	64	70.2
Minimum	33	42	56	60	53	50	48	54	49	49	50	56	55	49.4

*Data for October from study area.

TABLE 20 (continued)

Daily Temperatures	Dates November 1970*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maximum	66	60	66	63	61	63	68	70	65	71	61	63	62	61	59	50	48	48
Minimum	56	56	46	40	38	37	44	38	46	52	55	54	43	40	44	30	28	24

Daily Temperatures	Dates November 1970 (continued)												Average
	19	20	21	22	23	24	25	26	27	28	29	30	
Maximum	58	64	57	61	65	36	36	52	60	66	60	65	59.5
Minimum	31	46	29	26	24	19	14	24	36	33	38	36	37.6

*Data for November from study area.

TABLE 20 (continued)

Daily Temperatures	Dates December 1970*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maximum	54	68	65	64	46	45	48	42	58	64	60	60	45	45	46	51	57	53
Minimum	30	42	38	34	24	26	20	17	31	32	30	43	32	26	27	28	38	29

Daily Temperatures	Dates December 1970 (continued)													Average
	19	20	21	22	23	24	25	26	27	28	29	30	31	
Maximum	60	52	42	55	61	48	38	36	43	40	31	38	38	50.1
Minimum	34	35	36	43	42	25	25	29	20	22	19	19	20	29.5

*Data for December (26-31) from Climatological Data-Virginia (December 26-31), and rest from study area.

TABLE 20 (continued)

Daily Temperatures	Dates January 1971*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maximum	47	46	50	63	64	40	37	28	29	32	32	48	36	54	45	34	38	32
Minimum	28	20	25	29	37	29	26	24	25	29	30	29	30	31	29	24	23	22

Daily Temperatures	Dates January 1971 (continued)													Average
	19	20	21	22	23	24	25	26	27	28	29	30	31	
Maximum	30	35	46	50	55	41	42	62	42	32	49	62	41	43.3
Minimum	17	16	13	39	25	24	25	39	20	16	16	41	22	25.9

*Data for January (26-28) from Climatological Data-Virginia, and rest from study area.

TABLE 20 (continued)

Daily Temperatures	Dates February 1971*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maximum	22	28	28	34	48	48	49	38	46	34	48	60	62	42	50	58	55	67
Minimum	13	17	18	24	33	27	27	28	26	18	26	33	33	30	24	26	24	28

Daily Temperatures	Dates February 1971 (continued)										Average
	19	20	21	22	23	24	25	26	27	28	
Maximum	69	68	60	64	60	53	59	65	73	67	51.9
Minimum	42	48	40	48	42	32	29	35	56	46	31.2

*Data for February from study area.

TABLE 20 (continued)

Daily Temperatures	Dates March 1971*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maximum	52	50	44	41	56	62	58	40	50	53	59	58	72	58	72	72	48	53
Minimum	40	40	37	31	30	40	36	29	26	25	35	33	51	44	48	48	32	28

Daily Temperatures	Dates March 1971 (continued)													Average
	19	20	21	22	23	24	25	26	27	28	29	30	31	
Maximum	60	47	56	65	64	48	46	47	42	52	59	52	57	54.6
Minimum	40	38	36	46	38	29	25	32	25	27	44	38	31	35.5

*Data for March (29-31) from Climatological Data-Virginia, and rest from study area.

TABLE 20 (continued)

Daily Temperatures	Dates April 1971*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maximum	71	70	60	66	66	48	51	63	75	66	70	70	84	71	61	72	67	70
Minimum	34	44	36	37	41	38	37	33	36	37	32	33	44	40	32	35	43	45

Daily Temperatures	Dates April 1971 (continued)												Average
	19	20	21	22	23	24	25	26	27	28	29	30	
Maximum	74	73	80	63	60	72	73	74	76	64	68	72	68.3
Minimum	42	40	40	47	42	46	35	40	41	47	44	36	39.2

*Data for April from study area.

TABLE 20 (continued)

Daily Temperatures	Dates May 1971*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maximum	70	70	74	68	76	81	66	82	74	70	78	81	80	74	66	67	82	82
Minimum	38	48	44	39	44	58	56	54	53	48	47	60	62	54	48	57	54	50

Daily Temperatures	Dates May 1971 (continued)													Average
	19	20	21	22	23	24	25	26	27	28	29	30	31	
Maximum	88	81	66	72	75	78	79	82	81	60	60	60	78	74.2
Minimum	57	62	58	50	45	52	64	66	53	54	55	57	60	53.1

*Data for May from study area.

TABLE 20 (continued)

Daily Temperatures	Dates June 1971*																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Maximum	78	84	85	89	86	91	88	87	80	78	83	86	88	88	70	65	74	78
Minimum	57	59	64	68	62	66	70	68	62	59	54	64	68	67	66	62	57	58

Daily Temperatures	Dates June 1971 (continued)												Average
	19	20	21	22	23	24	25	26	27	28	29	30	
Maximum	83	83	92	88	81	85	90	90	91	94	92	90	84.6
Minimum	64	65	66	68	65	68	71	74	74	75	73	73	65.6

*Data for June from study area.

SECTION F

Census Method Forms

TABLE 21

Field Observations Form

Date: _____ Observer: _____

Time at Start: _____ Time at End: _____

Official Sunrise: _____ a.m. Official Sunset: _____ p.m.

Temp. at Start: _____ Temp. at End: _____

Weather: _____ Wind: _____

Humidity: _____ Precipitation: _____

Ground Conditions: _____

Total Man-hours Spent in Field: _____

Observations						
Number Observed				Age (Juv, 1/3, 2/3; adults)	Location	Habitat & Activity
Cock	Hen	Young	Brood			

TABLE 22

Landowner Observations Form

Name: _____ Month: _____

Date	Number Observed				Age	Location	Habitat & Activity	Time
	Cock	Hen	Young	Brood				

Under Age: Juv., 1/3, 2/3, 3/4, or adults.

Under Location: Whose property, farm on which the pheasant was seen.

Under Habitat: Example: pasture, grain (corn, wheat, soybeans, etc.), hedgerow, roadside, or woods, etc.

Under Activity: Example: eating grain, mating, courting, or fighting, etc.

TABLE 23

Fall Flushing Count Form

Date: _____ Observer: _____

Time at Start: _____ Time at End: _____

Official Sunrise: _____ a.m. Official Sunset: _____ p.m.

Temp. at Start: _____ Temp. at End: _____

Weather: _____ Wind: _____

Humidity: _____ Precipitation: _____

Ground Conditions: _____ No. of Dogs: _____

Total Man-hours Spent in Field: _____

Observations

Number Observed		Time	Location	Habitat & Activity
Cock	Hen			

TABLE 24

Cock Crowing Count Form

Date: _____ Observer: _____

Time at Start: _____ Time at End: _____

Official Sunrise: _____ a.m. Ground Condition: _____

Temp. at Start: _____ Temp. at End: _____

Weather: _____ Wind: _____

Humidity: _____

Amount of Dew on Cover: _____ (light, medium, or heavy)

Station Number	Time	Total Calls Heard	No. Birds Heard	Cocks Seen	Hens Seen	Remarks
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
Totals						

TABLE 25

Pheasant Hunting Report
November 16-17, 1970

1. Is this the first time you have hunted pheasant? _____

   a) If answer is no, where else have you hunted? _____

2. Number of hours spent hunting: _____

3. Number in hunting party: _____

4. Number of dogs used: _____

   a) If dogs were used, did you get a point? _____

   b) If dogs were used, were they trained for pheasants? _____

5. Did the pheasant run? _____ Approximate distance: _____

6. Approximate time when pheasant was shot: _____

7. Exact weight of the cock: _____

8. Type of cover from which the pheasant was flushed: _____

   _____

9. Did the pheasant have any resemblance of a white ring around his neck? _____

10. Was the pheasant banded? _____

Name: _____

Address: _____

_____

SECTION G

Inhabitants of the Sandy Point Area

TABLE 26

Inhabitants of the Sandy Point Area

J. C. Smith
E. D. Smith
M. R. Dotson
R. G. Dotson
L. R. Dotson
D. D. Lampkin
R. D. Garrison
E. Garrison
M. R. Smith
A. L. Smith, Jr.
J. N. Smith
J. W. Smith
A. L. Smith III
L. W. Ruffin
M. M. Hula
J. A. Hancock III
D. Overman
F. Hula
M. Hula
A. Hula
G. Wilson
A. N. Hofmeyer
D. L. Hofmeyer
J. Hofmeyer
A. N. Hofmeyer, Jr.
S. J. Hula, Sr.
S. J. Hula, Jr.
R. Wray
E. L. Newsman
J. P. Towe
K. M. Smith
E. Peterson
Z. B. Hula

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